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HEALTH FIRST

HEALTH FIRST

THE FINE ART OF LIVING

BY

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TO MY WIFE

ALICE DELAFIELD CHAPIN

PREFACE

There probably has never been a time in the history of the world when the question of conserving human life has loomed up with greater importance than at present. But life without good health is usually neither enjoyable nor efficient. We need men and women with strong arms, vigorous brains, and clear eyes to face the pressing problems of the day.

In constructing a true map of physical life, its continuity in all the varying periods must stand out prominently. Each interval of time has a direct and continuous influence on the following age. The different spheres of life are complemental; each reacts upon the other for good or evil. The physical and chemical bases of life are the same at all periods. The changes that take place during the life-cycle are not fundamental but secondary and hence capable of being influenced. A change in form is accompanied by a gradual alteration of function.

In order to understand and properly manage

any period, we must know the conditions that precede and are liable to follow it, so that we may make the necessary changes in our conduct of life. This will form a promising method of conserving both life and health. It is believed that in this way life can be prolonged and made more efficient; hence the writing of this book.

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HEALTH FIRST

" 'Tis life, whereof our nerves are scant,
Oh life, not death, for which we pant;
More life, and fuller, that I want."

—*Tennyson.*

HEALTH FIRST

CHAPTER I

HEALTH FIRST: THE NEED OF THE TIME

IT has been estimated that one million two hundred thousand Americans die every year. Professor Irving Fisher believes that at least forty-two per cent. of the deaths now occurring in the United States are unnecessary. It is usually figured that there are ten cases of serious sickness for every death, and yet much ill health is clearly preventable.

Can human life be prolonged? This depends largely upon the preservation of health and the prevention of illness. Not only efficiency in every line, but the conservation of life itself depends upon a proper amount of vigor. Good health is not so much an accident as many suppose. It is largely a purchasable commodity, but every one must be willing to pay the price. One of the most interesting questions of the day

is the placing of a proper estimate on the price of good health. It is a fundamentally important question for the individual man as well as for the nation.

Perhaps the most practical way to attempt a solution is to construct a health map of life. This will involve a study of the various conditions that make for health and vigor at different ages and in diverse environments. It is vastly more important to learn how to *keep* well than how to *get* well; but this involves a knowledge of correct habits of living in every period of life, and includes such commonplace topics as proper eating, sleeping, exercise, and mental poise. A popular topic in recent years is included under the term, "First Aid to the Injured." Let us try to popularize a course on "First Aid to the Well," so that people may know how to keep strong. It will repay consideration in results of conserved vigor that otherwise might have been dissipated. The subject of preparedness is just now in the air. Preparedness for life certainly requires as its first requisite the possession of sound health.

We hear a great deal of infant mortality and the large waste of child life that has engaged the attention of sanitarians and statesmen. Much

has already been accomplished in remedying this great evil, but little attention has been directed toward the needless waste of life among the middle aged and the old. More knowledge and effective action are required to conserve life at all ages. Few realize how much can really be accomplished if we have the will to act upon knowledge already in our possession. Not only can the span of life be lengthened, but, quite as important, the days of usefulness and efficiency can likewise be prolonged. Individual human life and the power of the race in its ascending struggle can thus be enormously strengthened, with a corresponding gain to civilization.

The recognition and treatment of actual diseases, which should be exclusively the business of the attending physician, are not included in the scope of this volume. It is believed by the writer that much harm, sometimes of a permanent nature, follows from the attempt to diagnose and handle illness from information found in popular treatises that the amateur has neither the training nor the experience properly to apply. Every intelligent person, however, should have a knowledge of the general laws of health. They can then apply themselves successfully to

the art of keeping well and good health will be popularized.

Vigorous health is not only valuable, but it is likewise a possession that it is our duty to cultivate. This thought is well expressed by Herbert Spencer in the closing chapter of his book on "Education." He says:

> Perhaps nothing will so much hasten the time when body and mind will both be adequately cared for as a diffusion of the belief that the preservation of health is a *duty*. Few seem conscious that there is such a thing as physical morality. Men's habitual words and acts imply the idea that they are at liberty to treat their bodies as they please. Disorders entailed by disobedience to Nature's dictates, they regard simply as grievances: not as the effects of a conduct more or less flagitious. Though the evil consequences inflicted on their dependents, and on future generations, are often as great as those caused by crime; yet they do not think themselves in any degree criminal. It is true that, in the case of drunkenness, the viciousness of a purely bodily transgression is recognized; but none appear to infer that, if this bodily transgression is vicious, so too is every bodily transgression. The fact is, that all breaches of the laws of health are *physical sins*.

In all fields of life health counts for more than is usually appreciated. Even in religion the

medieval conception of a weak or ailing body as an aid to spiritual development has been abandoned. As a rule, a healthy body and a healthy soul go together. Much of the hectic and abnormal in religion have come from a lack of bodily health. The best moral and spiritual outlook runs parallel with physical health. The exceptions to this rule, and they are doubtless many, do not invalidate the general principle. The Founder of the greatest religion told His followers that He came to bring them a more abundant life.

A popular slogan of the day has been crystallized in a short phrase, "Safety first." Many accidents are prevented by having this notice displayed in public places. It might be well if another sign could be added to attract the attention of the crowd. It would read, "Health first."

CHAPTER II

HEALTH FOR THE BODY: AN EFFICIENT MACHINE NEEDED

LET us for a moment simply think of the human body as a machine. A successful mechanic whose duty it is to operate a machine takes the greatest care of it. His success depends on keeping his engine, whatever it may be, in good running order. If the mechanism needs oiling or a wheel or a cog gets a little out of place, the engine runs badly or stops altogether. Before starting for the day, the careful chauffeur looks over the mechanism of his car to see if everything is in proper working order. He knows that the success of the day's run depends largely upon this preliminary care.

Few people realize that the human body is the most perfect, and at the same time the most complicated, machine in existence. Moreover, this elaborate machine is under our own control. Its successful operation means that all the parts must work in harmony.

If the stomach of a man is out of order, at once the whole machine works badly. The man becomes low spirited and not up to the work of the day. He is not bright and alert, but rather depressed and apprehensive, for the brain quickly sympathizes with a badly working stomach. This is a familiar example of many minor disorders that may be easily corrected, yet, if allowed to continue, will produce bad effects.

Efficiency in life depends much more than is appreciated upon good health. Many a failure can be traced to low vitality. The machine is not working up to its full capacity.

In a recent annual report of the New York Association for Improving the Condition of the Poor the extent to which poverty is caused by sickness is shown in a startling way. Out of many thousands of dollars spent in material relief for destitute families in their homes, ninety-six per cent. was given to families who had to seek aid on account of the sickness or death of the wage-earners. The Charity Organization Society has found that fully two-thirds of the cases of poverty it is called upon to investigate depend directly or indirectly upon sickness.

This is also an important social as well as in-

dividual problem, as poverty increases sickness and disability as well as being caused by these conditions. In a recent survey of several poor districts by the New York Board of Health an undue increase of degenerative diseases was found. The following quotation from their bulletin emphasizes this point:

> Our study of the mortality of the city by sanitary areas has supplied us with ample proof, if such proof, indeed, were needed, that the family income is a most important factor in raising or lowering morbidity and mortality. Where the family income is sufficient to permit living under a reasonably favorable condition (sanitary housing, ample food, adequate clothing, wholesome recreation), sufficiently to permit of prompt and efficient medical attention in case of illness, sufficient to permit of proper nursing of the ill, morbidity and mortality are invariably lower; whereas, when conditions are reversed and poverty, with its train of social complications exists, morbidity and mortality are high, no matter how favorable the age and sex constitution or other similar factors of the population may be.

Several surveys in different places made by the Children's Bureau of the United States Government shows that the curve of sickness and death among infants and little children follows the curve of earnings of the wage-workers.

While statistics show that the average length of human life is being prolonged, this improvement has come largely through the saving of infant and child life. As we shall show in a future chapter, this is unfortunately not due to a lessening of the diseases and degenerations that come during middle life and take off many in their prime. Diseases of the heart and lungs and of the liver and kidneys are on the increase. This is not only due to the added strain of life in modern times, but to the fact that diseased conditions are not recognized early enough to admit of preventive treatment. The machine has not been watched with sufficient care, and some vital part of it has been hopelessly disarranged.

In considering the question of health, life may naturally be divided into three parts. The first period is that of growth, when accretion and repair are more active than waste: the cells of the body are built up more quickly than they disintegrate. After growth has been accomplished in all its details, there ensues a period when waste and repair are virtually equal; and finally, as the bodily machine begins to wear out, waste becomes more active than repair and a slow disintegration of the body naturally ensues.

Roughly speaking, these periods correspond to youth, middle life and old age.

It is very necessary for every person to have a clear conception of how these different periods vary in their requirements, as the secret of health and long life is largely involved in this problem. In the conception of the human body as a complicated engine we may consider construction, repair and waste as the important factors in reference to starting the machine in a satisfactory way and keeping it running as long and as easily as possible.

Much may be done in the line of conserving health and life by continual education in the laws of hygienic living as they apply to different ages and conditions. As far as the person is concerned, we believe that much may be thus accomplished both to increase healthfulness and prolong life. Many a successful man breaks down when he should be at the summit of his power. The machine has not been carefully watched, and some part gives out before its time.

How can we tell when any of the parts of the human machine are undergoing an undue strain or are beginning to give out? We must do what the factory foreman does when his machine needs

overhauling: call in a competent engineer to go carefully over all the parts in order to see if any screw is loose or any joint is in need of repair. In the case of the human machine the well-equipped doctor is the man to make the examination.

The Health Department of New York City has recently started a system of stated physical examinations of its many hundred employees, and finds a great saving of efficiency by recognizing and preventing the early beginnings of disease. Among two thousand cases reported, many showed some weakness or susceptibility which, if neglected, would be likely to be followed by chronic organic lesions and thus to a shortening of life. Twenty-two per cent. of those examined showed an albuminuria of greater or less extent, and in some this was combined with a high blood pressure. In these cases a kidney affection is sure to develop if steps are not taken to try to alter the condition. On a later examination about ten per cent. of the persons showed a very decided improvement over their former physical condition.

Large employers of labor, such as railroads and industrial corporations, are finding it economical to attend to the health and general wel-

fare of their laborers, as their efficiency is thus much increased. The United States Steel Corporation has established a Bureau of Safety, Sanitation, and Welfare for its employees. This not only safeguards the workers in shops and mines, but operates a scheme of welfare work in the home. They find that laborers that are poorly cared for or worried by illness cannot do good work.

The Ford factory at Detroit has recently had a thorough examination made of the many thousand men that had been hired, in order that they might be put to work in the most efficient way.

The American Association for Labor Legislation advises compulsory health insurance in order to favor more active work in the prevention of disease. They find the death-rate for American wage-earners twice that of professional men, with a correspondingly high sick-rate. Despite the greater prevalence of tuberculosis among wage-earners, and their early susceptibility to the degenerative diseases of middle life, with an excessive death-rate among the industrial population, the workers are often unable to secure proper medical attention in time to ward off these evils.

AN EFFICIENT MACHINE

In a series of tests made among employees of commercial houses by the Life Extension Institute of New York, it was found that a large percentage of the men showed some physical defects. Such facts need not cause undue alarm, because many of these defects can be relieved if discovered early enough. In line with this investigation, it is interesting to note that out of more than five thousand applicants recently examined in New York for admission to the marine corps, only forty-five per cent. were finally accepted as physically fit for enlistment. An analysis of the cause of rejection in these cases showed that in fully fifty per cent. of them early medical or surgical treatment would have removed the defect for which they were rejected. The Charity Organization Society estimates that out of thousands of men and women examined, seventy per cent. were found to have some weakness that might shorten life, but which could be prevented if taken in time.

The lesson that all this teaches is that every person should be periodically examined in order to find out if the bodily machine is in good working order. Groups of persons, such as fraternal societies, lodges, or trade organizations, should

arrange with a competent doctor to give every member a thorough overhauling at stated times. Special groups might be formed for this sole purpose, which could include whole families, who would thus also receive the benefits of periodical examinations. In this way it would be possible to prolong life and prevent much disability, as unfavorable conditions would thus be early discovered and in many cases prevented.

There is an old tradition that the Chinese employ physicians to keep them well rather than to attend them when sick. In case of illness, the doctor is not paid but penalized for allowing such a thing to happen. This may be largely legendary but it contains the germ of an important truth. As far as each individual is concerned, it would certainly be wiser to pay a physician to maintain one in health rather than for attendance in illness.

Success in life in virtually all its pursuits, and happiness in any state, are conditioned on good health. Efficiency and strength go hand in hand. Let the human machine be constantly overhauled, so that it may be kept in as good a state of repair as possible.

CHAPTER III

HEALTH FOR THE INFANT: A RIGHT START

IT was a saying of Dr. Holmes that the proper treatment of some diseases should begin one hundred years before birth. This is only one way of emphasizing the responsibility of bringing children into the world, as parents have a most serious duty to perform to themselves, their offspring, and society at large.

While the span of a century cannot be conveniently utilized as advised by Holmes, at least the year before birth should be regulated as nearly as possible in the interests of the coming child.

PRENATAL CARE

A healthy, vigorous infant presupposes healthy, vigorous parents. As far as the mother is concerned, her care should begin with the period of conception, which means that she should maintain herself in as good a condition of health as possible while she is carrying the child. All

the functions of her body must be satisfactorily performed. No social or household duties must be allowed to interfere with this principal business of her life.

At this period it is well for her to systematize her life so that the best results will be obtained. Plenty of pure, fresh air is essential. Her living and sleeping-rooms must be well ventilated, those with a western or southern exposure being preferred. She should take the outer air in daily walks or drives, or by sitting much on a piazza during warm weather. Regular exercise is very beneficial, but nothing severe or jolting should be allowed. As physical exercises involving much muscular exertion or fatigue are not advisable, all lifting or straining is forbidden. Plenty of rest and sleep is desirable. The night's sleep should include at least eight hours, and more if desired. It is also well to lie down and rest for a season in the middle of the day. Even if sleep is not possible, the rest and relaxation will prove beneficial.

The clothing must be comfortable and loose-fitting, especially avoiding any undue pressure upon the chest and abdomen. Clothing that is so arranged as to be suspended largely from the

shoulders is well adapted for this period, and the constriction by ordinary corsets or tight garters is undesirable. Shoes with low heels should be worn, as the high heels in vogue put an undue strain upon the spine and lower part of the abdomen.

A daily sponge bath with tepid water is refreshing in the morning, and keeps the skin in a healthy condition. This may be followed by gentle friction of the body with a coarse towel.

Though there is no scientific proof that special forms of diet have any influence upon the development of the child, the food should be nourishing and digestible. While full meals are desirable, all overeating and any indulgence in rich or made dishes, fried and indigestible foods, and an excess of tea, coffee, and sweets had better be avoided. Alcoholic beverages are not to be taken unless specially prescribed by a physician. Cereals, milk, eggs, all plain vegetables, ripe or cooked fruits, fresh fish, and meats, such as beefsteak, roast beef, lamb, and chicken, should form the principal part of the diet. It is usually better to take meat only once daily. The free drinking of pure water between meals and at bedtime is beneficial by keeping the kidneys in good work-

ing order. The bowels must act once daily at a regular time. This function may be aided by diet, such as fresh fruit, prunes, figs, bran bread, and the coarser cereals, with proper outdoor exercise.

The influence the mind exerts on the body is recognized by all physicians, and therefore it is very important that the future mother should keep as composed and cheerful as possible. To this end, she should be kept from undue cares and worries and have as bright surroundings as circumstances will allow. Strong mental excitement and unrepressed emotions have a bad effect at this time. Hence, while all sane amusements are desirable, the witnessing of exciting or emotional scenes or plays should be avoided. In a general way the care of the future child is taking place during the whole of the previous life of the mother, but in a very special way is such care obvious while she is carrying the baby.

AFTER BIRTH

In order to have healthy growth, every mother should, if possible, nurse her own baby. While occasionally cases may arise where a mother's milk does not seem to agree with her infant, such

instances are rarer than are supposed. These cases are often due to faulty habits on the part of the mother or irregularity in feeding the baby. Such conditions can usually be corrected, in order that the baby may continue to have its natural nourishment.

The nursing mother should lead a quiet and regular life, eating at stated times, resting frequently, and taking moderate exercise. She must take no rich and highly seasoned food or acid substances, but otherwise she may continue her usual diet. If her milk tends to be scanty, a generous cupful of oatmeal or corn-meal gruel may be taken between meals and at bedtime. Regularity in nursing is all-important. This not only affects the baby favorably, but the mother's own milk as well. Too frequent nursing often induces trouble. Whenever the baby cries, it is put on the breast by some mothers in order to quiet it; but this only leads to more fretting later on from the indigestion and colic induced by too frequent feedings. Young babies must not be fed oftener than every two hours through the day, and frequently they do better on three-hour intervals. One nursing, or possibly two, at night will suffice, as the mother's

rest must not be continually disturbed. Fatigue and nervousness from insufficient sleep will affect the mother's milk as disastrously as a faulty diet. It may be occasionally desirable to take the infant entirely from the breast during the night, so that the mother may have a complete rest, possibly sleeping in a room out of reach of the baby's cries. Sometimes a few nights so regulated will restore both the mother's poise and her milk. A single bottle, or perhaps even plain water, will tide the baby over during this temporary absence.

In case the mother is not able to secrete sufficient milk to satisfy the baby, it is well to supplement the breast with the bottle. This is known as mixed feeding, and instead of alternating breast and bottle, it is usually better to let the baby get all it can from the breast and then make up the lacking amount by the bottle. The constant use of the breast at regular times will keep it stimulated and in better working order. It has also been found that cow's milk is apt to digest a little easier if mixed with mother's milk.

The importance of breast-feeding is emphasized by the fact that bottle babies are not only more

apt to get sick with digestive troubles, but show a very much higher mortality than breast babies. It has been estimated that one out of eight babies born in the United States dies during the first year, and that half of these deaths are preventable. Good breast-feeding plays a great part in this prevention. Over eighty per cent. of the babies dying before the completion of the first year are bottle fed. In many cases, however, mothers are unable to nurse their babies at all, or after a time the milk completely fails. Then the bottle must be exclusively employed. The first requisite is to get a supply of fresh, clean cow's milk. It was formerly supposed that the milk of one cow was desirable, but it is now known that the average milk from a herd of cows, the larger the better, is more constant and uniform, and thus safer for feeding babies.

Such milk must be collected with extra care. The cows must be kept scrupulously clean, and the milkers use every precaution, by washing the hands and avoiding soiled clothing, to keep dirt out of the milk. Rapid cooling of the milk is desirable, and it should then be carefully bottled and kept cool until used. Bacteria that produce changes in the milk will not grow under

fifty degrees Fahrenheit. Milk intended for the baby should never be kept in pitchers or open utensils, as it quickly absorbs odors or impurities from its surroundings. An extra quality of cow's milk known as "certified milk" is now procurable in many communities, and is desirable for the baby. It is furnished according to a certain standard regulated by a committee of the local medical society, which must be lived up to by the producer of the milk. The term cannot be used unless these conditions are fulfilled, and hence a very pure milk is constantly produced. If the condition of the milk is uncertain, it is safer to boil or pasteurize it. The disadvantage of the heated food may be overcome by giving a little orange juice once daily.

Cow's milk differs from human milk in several respects. While the fats are about the same in both, cow's milk contains double the quantity of protein (casein or curd) and less sugar than human milk. If it is diluted one half to get the protein right, there is too little fat and sugar in the mixture. A convenient way to regulate this error is to use the top half of a quart-bottle of milk after the cream has risen. This is technically known as top milk. Simple boiled water

or barley-water make the best diluents, and a teaspoonful of plain sugar or sugar of milk may be added to the bottle. The amount of dilution depends upon the age of the infant. At birth about one third of the contents of the bottle may consist of top milk, and this may be gradually increased with the age of the child, according to the judgment of the doctor or nurse. These matters, however, had better be regulated by a skilled physician, who will manage the case according to individual needs. The baby's feeding and nutrition are too important to be governed by any one not well versed in the various methods of modifying milks according to the necessities of each case. It must not be forgotten that babies daily need one or two ounces of water in addition to their milk food. They sometimes fret because they are thirsty rather than hungry.

Whenever a baby suffers from illness of any sort, the food must always be temporarily weakened. When the bowels are at fault, as in diarrhea, it is safe at once to clear the bowels by a laxative and then stop milk entirely for a short time, as it does not digest well under these conditions. Barley-water or plain water may be given in the interval.

Great care must be taken to keep the baby comfortable as far as its clothing, bed and general surroundings are concerned. A napkin placed too tightly, a pin in a bad position, or constriction of various articles of dress may keep a baby crying and uncomfortable. When an infant cries, an effort should always be made to ascertain the cause in order to correct it. Sometimes simply changing its position will quiet it.

Once a day the baby should be bathed. For young babies a temperature of ninety-five degrees Fahrenheit is desirable, and older infants may have the water at ninety degrees Fahrenheit. If a thermometer is not at hand, the elbow of the nurse placed in the water will be a rough, but fairly accurate, indication of a comfortable temperature.

HEALTHY DEVELOPMENT

A few facts relative to growth during infancy and early childhood may be of interest as a general guide in watching this period of life. While absolute rules cannot be given for every case, there is a normal ratio that, within certain limits, should be attained by the average infant.

The exact ratio for each individual child is governed by hereditary influences determining the general framework of the body at birth as well as by the kind of food available after birth.

Some infants are born with small bones, perhaps in this respect resembling one or both parents. The birth-weight of such an infant, as well as that attained later, will be less than that of a baby having a larger bony framework. Different races, as well as families, show considerable variation in this respect. Needless alarm is sometimes excited if the physician or mother merely considers averages that are taken from a different class or community and hence do not particularly apply to the baby under consideration. In every case, however, the extremely rapid growth of the infant after birth makes careful observation of all the phenomena connected therewith not only interesting, but important.

In a series of observations, covering several hundred cases, made by the author, the average birth-weight varied from six to eight pounds, the males usually weighing a little more than the females. The growing infant should double its birth-weight at five or six months and treble

it at fifteen or sixteen months. Growth in length is likewise extremely rapid during infancy, especially in the earlier months. It is most marked during the first month, a little less during the second, the rate of rapidity decreasing with each month. As a general guide, it may be said that the body lengthens about eight inches during the first year, three and a half inches during the second, three inches during the third, two and a half inches during the fourth and fifth, and at about the same rate up to the fourteenth year.

While infants at birth may vary greatly in size, every child should develop in proper proportion, the various parts of the body having a symmetrical relationship to one another. As an example, the circumference of the head is greater than the circumference of the chest at birth and remains so up to the middle of the first year, when they begin to approximate in size. By the end of the first year the chest is growing faster than the head, and this disproportion steadily increases. At birth the circumference of the head averages from thirteen to fourteen inches, at the end of the second year about eighteen inches, at the seventh year about twenty and a

half inches, and at the completion of growth twenty-two or more inches.

In the human being the brain assumes overmastering importance in the scheme of evolution, hence its proper growth and development are relatively of more importance than that of other parts of the body. The extremely rapid evolution of the brain during infancy, and the fact that the future efficiency and well-being of the child depend largely upon its normal and healthy growth, render a study of the infantile head of great interest. As the skull is fairly representative of the brain during the years of its first development, measurements taken during infancy are more instructive as to brain size and development than those taken in later years. The skull changes considerably in its proportions during the first three years of life, and then more slowly up to the end of the seventh year, when it has very nearly attained its full size. After birth there is noted a gradual and steady enlargement of the great circumference of the skull, and, from this, of its estimated volume.

Although no intellectual growth can be said to take place under two years, there should be an active evolution of the front of the brain,

with an increase of the perceptive organs. The first rapid growth of the brain after birth is more in bulk than in the size and complexity of the convolutions. Hence in early infancy the higher centers have only a slight development and function. With proper evolution, the convolutions grow and become arranged in functional groups, which groups, by their growth, alter and modify the shape of the infantile skull. If the skull is small or improperly shaped in any part, the brain in such an area is imperfectly developing. A certain amount of asymmetry is, however, found in all skulls, as in other members of the body, and, unless very marked, has no great significance.

The principle of biology, that the development of the human being reproduces on a small scale the development of the race, is well shown in the infant's brain. The higher centers and the association fibers are developed late in the child. They are likewise the last acquisitions of the race. The lower and more fundamental animal traits are more transmitted by inheritance than the higher ones. Good nutrition and good training are required to develop the higher functions of the brain in a satisfactory manner.

The rapid growth of the body during infancy is accompanied by a speedy acquisition of various functions. For a time after birth the greatest relative strength is shown in the hands and arms, as one can easily verify by allowing an infant to grasp a finger and then trying to pull it away. At about three months the muscles of the neck have developed sufficiently to allow the infant to hold up its head in an uncertain way. At the seventh or eighth month the muscles of the back have become so strengthened that the baby can sit up and shortly after this it may be allowed to creep.

Free play should be given to the muscles of the arms and legs from the first, as muscular and bony development are thereby encouraged. The limbs must not be so tightly bound as to prevent kicking and active motions. The bones of the legs thus grow and straighten out, but this will be checked if the infant is made to sustain the weight of the body too soon. The average baby should not be encouraged to stand before the twelfth month. Efforts to walk may be begun from then on to the fifteenth or sixteenth month. When walking has been established, the legs should be straight. The chest develops rap-

idly, with enlargement of the pectoral and shoulder muscles, and, as stated before, its circumference usually equals that of the head by the end of the first year.

THE BEGINNING OF MENTAL GROWTH

The perceptions and emotions of the little child are relatively active, while anything resembling will-power and self-control are still in abeyance. Just after birth the brain and nerve-centers act only automatically or by reflex action. For the first few days the baby is deaf, and it will not follow an object with its eyes until the third week. By the third month it reaches out its arms for objects and may recognize persons. The rudiments of memory are now developed, and by the fourth or fifth month a few familiar persons may be remembered and recognized. It is not until the third year, however, that memory develops very rapidly.

The connection between names and things may be noted as early as the last of the first year. During the second year words and short sentences may be employed, and in the third and fourth years a marked loquacity usually shows

itself. As a rule, girls begin to talk earlier than boys.

The beginning of emotions, such as pleasure or anger, may be noted at the end of the first year, but are more definite during the second and third years. While they may flare up suddenly, they are very transitory in nature. Small powers of reasoning, such as drawing inferences, may be seen as early as the third year. It is never wise to try to force any of the mental functions of the very young child, as it should merely develop its muscles and senses without the strain of trying to develop memory, the reasoning powers, or imagination. Infants and very young children are often injured by too much attention to these matters on the part of adults. Such forcing may develop precocious children, who are apt to become dull later on. Very young children who show unusual imagination or memory should not be encouraged in the early employment of these faculties.

EARLY RECOGNITION OF ILLNESS

It is always important that an early recognition of illness should be made, in order that a

successful prevention or treatment can thus be instituted, and a continuance of the disease sometimes thereby be avoided. It may be well to know that slight causes often produce very marked and sudden effects during the early years of life. This is explained by the active growth of infants and especially by the rapid development of the nervous system.

The various structures of the body are so intimately connected by the nerves that irritation in one organ may quickly be transmitted to another, which is aggravated by unstable nerve-centers that exhibit poor powers of inhibition and control. As an example, the irritation produced in the intestinal canal by undigested food may induce a high fever or even a convulsion. Thus a slight indisposition frequently presents the appearance of severe disease, while the converse of this is sometimes true, as serious illness may so blunt this delicate nervous susceptibility as to cause the real gravity of the case to be overlooked.

SIGNS OF DISTURBANCE

As the baby cannot describe its feelings, attention may be called to various conditions that are evidences of some disturbance.

IRRITABILITY OF TEMPER

In the absence of speech, the infant shows discomfort or suffering principally by cries and restlessness. If watched closely, it may by various signs indicate to a certain extent the seat of the trouble. In headache the hand will be frequently raised and held beside the head; in earache, the hand will be carried to the ear and will often pull upon that organ; in difficult and painful teething the fingers will be constantly inserted into the mouth, as if to pull out the cause of distress; irritation of the stomach and bowels may be accompanied by a continual rubbing of the nose. During an attack of colic the legs are drawn up over the abdomen, which feels hard, and there is likewise a writhing motion of the body.

Crying is a very constant accompaniment of all kinds of illness. Constant, uninterrupted crying is usually caused by earache, hunger, or thirst. If, after giving the baby suitable nourishment or a drink of water, it still keeps up a continuous, almost automatic cry, there is probably severe pain in the ear. This may be confirmed by pressing in front and behind this organ,

to see if the baby will wince. If there is some disease in the head, a sudden, piercing cry is uttered at intervals, between which there will probably be no fretting.

In pneumonia there is crying only during spells of coughing and a short time after; in pleurisy there is likewise crying only during coughing, but it is shriller and indicates more suffering than in pneumonia, and it is also produced by moving the child and pressing the affected side.

Crying just before or after a movement of the bowels, with a twisting of the pelvis, gives evidence of intestinal pain. When the hands are tightly shut, with the thumbs thrust deeply into the palms, and the toes are bent, there is nervous irritation which may eventuate in a convulsion.

CHANGES IN THE FEATURES

When illness is present, it is quickly shown in the countenance of the infant, which, during health, wears an expression of easy repose. In general, it may be stated that the upper part of the face is involved in diseases of the head, the middle part of the face in affections of the chest, and the lower part in disturbances involving the

abdominal organs. Thus in congestion or other diseases of the brain, the forehead and eyebrows will be sharply contracted, and the eyes will be exceedingly sensitive to light. Puffiness and swelling about the eyelids usually point to dropsy, which is often caused by some disease of the kidneys, following scarlet fever or other infectious sicknesses. In pneumonia and pleurisy the nostrils are sharply defined, and dilate and contract with the movements of respiration, which will appear more or less labored. The mouth is most affected in abdominal diseases, as is shown by the drawing of the upper lip, gritting of the teeth, and other movements indicating pain.

RESTLESS SLEEP

A well child always sleeps quietly, but an ill child sleeps fitfully and sometimes only when it is rocked or patted or carried about in some one's arms. If it is constantly kicking off the bedclothes, it is an almost sure sign either of intestinal indigestion or of early rickets. When it is impossible for a child to sleep well unless its head and shoulders are high upon a pillow, there is apt to be some disturbance in the heart or lungs.

If a child sleeps with its mouth wide open and the head thrown back, with noisy respiration, there is enlargement of the tonsils or adenoid tissue at the upper part of the pharynx that interferes with quiet breathing through the nose. A persistent boring of the back of the head into the pillow points to irritation in the brain. When a child sleeps with half-open eyes, there is apt to be moderate pain present, and if there is a constant movement of the lips, the discomfort is located in the gastro-intestinal canal. This sign, however, has not the grave significance that it has in later life.

STATE OF THE DISCHARGES

During infancy vomiting is a frequent and easy symptom when the stomach is simply distended by overfeeding. The infant shows no distress from this act and continues in a good condition of health; the stomach simply rejects any excess of food above that which it can conveniently hold and digest. But sudden and profuse vomiting without any error in diet may constitute the beginning of a severe illness, such as scarlet fever, diphtheria, or some brain disease.

Acute illness in early life may begin with vom-

iting in place of the chill suffered by older persons. Vomiting may also be a sign of local disturbance of the stomach, as when mucus is ejected in cases of gastric catarrh. Where tough curds are vomited, with the milk very sour, there is evidence of fermentation and an over-acid condition of the stomach. If this persists, the mouth will become red and sore from the irritation.

Much can be learned from the character of the discharges from the bowels. During the first two months there are usually three or four stools a day, and during the first two years an average of two movements a day. The stools are of a soft, uniform, semi-solid consistency, and yellowish color. In cases of bowel disturbance they may be green or contain hard, lumpy curds or have an admixture of mucus or blood, or be very watery. The bowels should then be promptly cleared out, and the food temporarily stopped.

The onset and course of sickness in the infant are frequently very rapid, and a good physician should promptly be called in all such cases. Early recognition and treatment will quickly restore to health many apparently grave cases.

CHAPTER IV

HEALTH FOR THE GROWING CHILD: NORMAL DEVELOPMENT

NO subject is of greater importance than the health of the growing child. During the period of development the mind as well as the body must be trained, in order that the ideal of a healthy mind in a healthy body may be attained.

The early years of life are, physiologically speaking, the most important ones we live. The rapidly developing body has at this time stamped on it the possibilities of future vigorous life or of early degeneration and decay. From the first dawn of life to full development there is constantly going on a remarkable series of rapid changes that are not only fraught with the greatest interest, but accompanied by the largest possibilities. It is for the latter reason a most hopeful period.

In the scheme of evolution the higher the animal, the more important becomes the proper

management of its time of growth. This is especially emphasized in man not only by a great prolongation of the period of infancy, but by the many subsequent years of development required before complete growth is attained. John Fiske was the first to elaborate this fruitful view of one of the fundamental laws of higher evolution, which not only throws a strong light on the method of evolution, but lays the greatest importance on the early years as influencing the future health and development of the person. The whole period of growth is a time of plasticity when the career of the person is no longer predetermined by the career of its ancestors.

The lower animal is born pretty fully formed, and can look out for itself almost from the beginning, independently of the parent. A slow growth means an increase in capacity for a high individual development and prolonged vigor. The parent must recognize the importance of this fact, since mistakes made at this time can never be completely corrected.

HEALTHY GROWTH

Let us briefly glance at a few facts pertaining to growth in children, as this will throw much

light upon their proper management. During infancy growth is steady and rapid, but in childhood it is relatively slower and takes place more in cycles. It depends very largely upon good heredity and a healthy, well-nourished state during the first years of life. Biological researches show that favorable embryonic conditions and good nutrition during the earliest years have the greatest influence in determining the full height and development of the person. If a child is fortunate in its birth and is well nourished up to the fifth or six years, there will probably be a healthy growth thereafter, as, even if there are poor conditions later on, nature will probably be able to compensate and make up for them. Each person has a certain normal size to attain, which will usually be reached if the first years have been favorable. Nothing will completely make up, however, for early unfavorable conditions. Race and heredity, other things being equal, govern very largely the possible limits of individual growth.

The two principal periods of acceleration of growth occur during the second dentition, or when the permanent teeth are cut, and at the period of adolescence. This roughly corre-

sponds, first, with the period from six to nine years in boys and girls, and, second, from eleven to thirteen in girls and from fourteen to sixteen in boys. This cycle of increase in height should precede and soon be followed by an increase in weight. There also tends to be some variation in growth in different seasons. In a series of studies made by a Danish observer and quoted by Tanner the period of most rapid increase in height among seventy boys from seven to fifteen years of age was found to be from April to August, and the least from August to December, while the greatest increase in weight occurred from August to December, and the least from April to August.

Whenever there is a rapid increase in height, the child is apt to grow thin and anemic, as the making of bone quickly uses up the red corpuscles of the blood. These children become nervous and irritable, requiring extra care at home and school. Such supervision must concern itself with a carefully selected diet, plenty of rest, and the avoidance of intellectual over-stimulation. These children must never be pushed at school, and it may even be necessary to remove them for a time if they are worried by their studies.

DIET AND HYGIENE

During infancy, childhood, and adolescence, proper nutrition plays a leading part in inducing satisfactory growth and development. Easily digestible, nourishing food is of the first importance at this time. The responsibility of parents does not end in supplying proper nutriment; they must see that the child actually partakes of it in sufficient amount. This fundamental requisite in healthy growth is too often left to the careless judgment and oversight of teachers, governesses, and even of servants.

A healthy appetite for plain, health-producing food is a thing to be cultivated from the beginning, and will then continue through life to the lasting benefit of the person. Much of the dyspepsia and ill health of later life come from a child's being allowed to indulge irregularly in all kinds of improper food, with the consequent fickle appetite and digestion.

There is no doubt that children, especially girls, are frequently pushed too hard in their studies during their period of growth. Lack of vigor in the adult may have its roots in this cause, especially when accompanied by a highly sensi-

tive nervous organization. School studies are piled up in endless profusion, while outside the session every available hour is taken up with special accomplishments such as music or dancing. The child soon becomes a little machine, to be wound up each hour of the day for some special labor or service.

Children must early be taught to be satisfied with plain, nourishing, and digestible food. It must be remembered that when growth is active the proteins, or tissue-making elements of the food, have great value. A properly balanced diet should contain fats and carbohydrates as well, but foods having a large content of protein must always be administered. This subject will be considered more at length in the chapter on health and nutrition.

In order to start digestion right, not only must the food be properly selected, but the greatest care must be given to the teeth. It should always be remembered that the health and preservation of the temporary teeth are necessary in order to favor a good set of permanent teeth. Any pus organisms allowed to lodge in the roots may injure the permanent teeth; milk-teeth must accordingly be filled if decayed, and preserved

as long as possible. This also helps preserve the proper shape of the jaw. Decayed teeth may cause earache, neuralgia, swelling of the glands in the neck, and poor nutrition from chronic indigestion due to imperfect mastication.

Warm, porous clothing in winter and light, loosely meshed garments in summer are the requirements to be kept in mind. In summer little children are often too warmly clad, and accordingly may perspire to excess. This may induce undue irritability and even a certain amount of debility, especially in neurotic children.

HEIGHT AND WEIGHT

In order to present a guide of average growth, the following tables have been combined and compiled from the studies of Boas on the rate of growth in height and of Burke on the weight of American children:

Table of height and weight of American boys

Years	Average height (Boas)	Average weight (Burke)
6½	43.9 inches	45.2 pounds
7½	46.0 inches	49.5 pounds
8½	48.8 inches	54.5 pounds
9½	50.0 inches	59.6 pounds
12½	55.4 inches	76.9 pounds

Years	Average height (Boas)	Average weight (Burke)
15½	62.9 inches	107.4 pounds
18½	67.4 inches	.....

Table of height and weight of American girls

6½	43.3 inches	43.4 pounds
7½	45.7 inches	47.7 pounds
8½	47.7 inches	52.5 pounds
9½	49.7 inches	57.4 pounds
12½	56.1 inches	78.7 pounds
15½	61.6 inches	106.7 pounds
18½	.....	114.9 pounds

HEALTHY MENTAL AND MORAL GROWTH

The mental growth and development of the child must be carefully watched from the very beginning. Just as the human embryonal life represents the various upward stages of animal development, so the child's mind reproduces in miniature the earlier stages of the growth of the race. The responsibility of properly understanding and guiding the physical and mental growth of the child rests directly upon the parents. It cannot be shifted to any one else. There are constant changes and variations always taking place that demand study and understanding. The parents are the ones to make this intimate acquaintance, calling for constant

watching and effort, which cannot be successfully relegated to nursery-maids, governesses, or teachers.

The great hopefulness in dealing with children lies in the fact that it is the plastic and impressionable age, but this may be equally potent for good or evil. It is necessary to recognize early the various tendencies that manifest themselves in a growing child in order that they may be understood and curbed or guided aright when occasion seems to call for interference. To this end it must be remembered that the child exhibits the elemental human forces and instincts. Just as the emotions are developed in the race before the reason, so it is with children. They can be moved by their sympathies long before they can be influenced by their intellect. Love is a surer guide for them than reason. This is the secret of the success of many mothers and a few teachers. The pedagogue is too apt to try to cultivate the intellect before the emotions and feelings are considered, and hence he often makes a failure of both.

The most lasting impressions of childhood are apt to come through the feelings. Thus the grief of the child should always be respected. While

transitory, it is likewise intense. It has been truly said that while to the old sorrow is sorrow, to the young it is despair. Parents might often relieve mental suffering if they would bear this in mind. This may be accomplished by turning the child's mind into other channels, as they can be quickly diverted.

At the end of infancy and during early childhood the imitative faculties come specially into play. The acts of older children, of adults, and even of animals, are faithfully copied without much idea of their significance. Up to the age of seven years, much of the training and education of the child must come from imitation. He learns by imitating, and little escapes his watchful eye. This throws a great responsibility upon parents and teachers, as a defective environment is at once reflected by the observing and imitative little child. Until the age of seven, most of the playing of children is imitative, shown by the delight in dolls and numerous toys representing things in real life; but after this, especially in boys, the games take on a more competitive form, involving muscular exercise. The little child being so imitative, suggestion plays a very important part in training. The absence of the critical

faculty at this time leaves the field open for suggestion to work with full effect.

Little children are born realists and even actors. They delight in truth as they apprehend it, and are not backward in expressing their exact thoughts. It is a mistake to exercise a constant repression on account of these traits. Rather should they serve as a basis for correct training in the broadening of their conceptions of right and wrong and even of life and duty.

There exists in many children a touch of barbarism that is merely an evidence of underdevelopment. Lombroso goes so far as to trace certain analogies between the child and the criminal. He considers that the germs of criminality are met with, not by exception, but normally, in the early years of human life. As in the embryo there occur naturally certain forms that would be monstrosities in the adult, so the child represents a man of undeveloped moral sense. Lombroso places passion and vengefulness, vanity and cruelty, in this comparison between the child and the criminal. Doubtless the great criminologist goes too far in exaggerating this analogy, but it affords food for serious thought and observation in those who study and bring

up children. Apparent cruelty, shown in a callousness to suffering, is often seen in children, but is due more to ignorance and lack of experience as to the meaning of pain than to defective moral sensibility. Real cruelty is seen in the undeveloped races, and is a sign of defective development. If it exists unchecked in the case of a child, it is usually an evidence of faulty training on the part of the parents.

HEALTHY MORAL TRAINING

In a study of the moral nature of the child the parent must sharply distinguish the essential from the non-essential in character-building. Thus a sort of rowdyism due to an excess of animal spirits need not be constantly repressed, but any duplicity must be instantly noticed and reprimanded. If a point is once made, it must be carried out, no matter how much of a struggle is required, and it is therefore wise to make an issue as rarely as possible, and then only for really essential points. The character of many a child is injured by querulous rebukes, constantly administered, until he comes to be considered almost in the light of an outlaw, perhaps all for small offenses that involve no essential moral

question. A little judicial blindness and an occasional kindly talk, combined with efforts to interest the child and guide his exuberant energy in proper directions will do much to conserve his moral and social self-respect.

The conduct of the child is largely influenced by the tone and temper of those about him. If a proper poise and self-control exist in the parents, it is sure to be reflected in the children. This is seen in the intellectual as well as in the moral sphere. A cultivated home will do more for a child's physical, mental, and moral health than the formal education of the finest schools. Thus the early hearing of good language will be of more lasting benefit than a later knowledge of all the rules of prammar. Many a college graduate uses poor or ungrammatical language as a result of early unfavorable surroundings that later cultivation has been unable entirely to eradicate.

ADOLESCENCE

There are three great critical periods of life: birth, adolescence, and beginning old age, in which rapid and suggestive changes are apt to take place in the organism.

A most interesting as well as critical time for

the child is the beginning of adolescence. Up to this time, as already noted, the child has lived the life of the race, but he now begins to develop more individual characteristics, and family traits also come out more strongly. There is a rapid growth of the body, especially marked in certain internal structures, such as the heart and lungs and reproductive organs, with increase in blood pressure and in general glandular activity. The peculiarities of sex now begin to manifest themselves, and boys and girls cease to mingle in the indiscriminate way of earlier childhood. Up to twelve years there need not be much differentiation of the sexes, but after this they must be separately considered.

Vague aspirations and a general restlessness show the stirring of a new life in the child's mind. Ideals begin to take strong hold, and, although often crude, prophesy in a general way the future bent of the character. If any trait is entirely absent at this time, it is not apt to be seen later in life. The emotional nature now becomes active, with varying phases and manifestations. Religious and moral questions may assume importance, and it is the age of conversion.

Parents must study and guide these nascent emotions so that they will assume a normal and healthy form. This is specially important where the child tends to be morbid and introspective. A careful moral training is as important as that directed toward the physical and mental natures. The child must be taught that there is a difference between real and imaginary conditions. An effort should be made to convert introspection into activity and at the same time to give some insight into the realities of life. This will be a great aid in counteracting selfishness as well as in true character-building.

The imagination becomes very active at this time, and care must be taken that it is fed by wholesome reading and surroundings. The cheap novel and "penny dreadful" too often get into the hands of growing boys, and hysterical love-stories into the possession of girls, to their great detriment. A certain element of adventure, exhibited in books of travel or discovery, may be desirable, and it is wise and profitable to interest children in nature-books.

As growth and development are rapid during adolescence, nothing must be allowed to conflict with the physical nature at this time. Over-

strain in school must be guarded against. It is specially desirable that girls shall not be pushed in their studies at the beginning of adolescence. At a time when a new life function is being established, the nervous energy and blood should not be diverted to the brain, as they can be better utilized in other parts of the body, to the lasting health of the child. It must be borne in mind that infancy and adolescence are the two most rapidly formative epochs of life, and quick growth predisposes to all kinds of disturbance. At bottom, diseased processes are often due to an overstrained physiological activity. A certain instability always accompanies periods of rapid development, and extra care is always required.

CHAPTER V

HEALTH AND EDUCATION: PROPER TRAINING

FEW realize how closely questions of health and education are intertwined and correlated. As a rule, the healthiest child makes the best student; and, conversely, too many studies that are not adapted to the age or condition of the child may have an unfortunate effect upon health. Physicians should have an important place on all school boards, and their advice should be sought in arranging the curriculum.

While true education must be a life undertaking, it is in the proper training of the young that this question assumes its greatest importance. Health and growth must both be considered at this time, but, as the period is a short one, the tendency is toward overpressure and a hurried undertaking of many things. This is a great evil, but much of it might be avoided if teachers and parents had a truer conception of the real function of education.

The tendency is to confuse education with mere instruction. The object of the former is training, that of the latter information. The object of education is not primarily or solely to impart knowledge; it is, rather, so to train the mind that it will have the capacity for selection and development and can gradually put itself in proper adjustment with the larger and higher life of the race.

The object of instruction, on the other hand, is to store the mind with useful and interesting facts. In the case of children there is apt to be too much instruction and too little education. The pressure that tries to induce much knowledge is in danger of lessening vitality without even giving corresponding power, success, or happiness. A proper physical development is necessary before mental growth can satisfactorily take place. Intellectual and spiritual education, important as they are to the evolution of the race, have their roots largely in a high physical development of the brain and nervous system, which in turn requires nourishment by good red blood. This general truth is not invalidated by exceptional cases where great intellectual energy has been evolved in feeble bodies. We cannot prop-

erly consider intellectual life without constantly bearing in mind its physical basis.

It has been proved from examinations of many school-children that, as a rule, the heaviest and tallest, or those of the best physique, stand highest in their classes and show the best intellectual development. Hence, if a child is poorly nourished or underdeveloped, the best thing, even for his intellectual growth, is to focus attention on his body for a time and let his mind be temporarily neglected. Competitive examinations at the end of the school year, after the fatigue of the winter's work, coming at a time when growth is usually most active in a child, too often result in nervous exhaustion.

Apparent stupidity or bad mentality in school children is often the result of physical causes that may and should be removed. Among several thousand public-school children recently examined in New York, about thirty per cent. suffered from defective eyesight. Enlarged and diseased tonsils, adenoids, and varying degrees of deafness were also frequent. Many others showed need of medical treatment, with a generally bad nutrition. A large number were found who were mentally unfit to be enrolled in

the regular classes, and a series of tests showed that this unsoundness of mind was due in most cases to disease or unhealthy surroundings at home. Among several hundred thousand children examined, sixty-four per cent. were found with defective teeth, which physicians now regard as a common cause of physical disability.

The growth of forced and so-called higher education has been relatively more rapid with girls than with boys. In the former, the question is complicated by the importance to themselves and the race of proper physical and sexual development during the period of growth. At a time when a new and important life function is being evolved, and the future well-being of the person is largely dependent upon its proper evolution, it is most important that the brain should not be crowded with work. This is a critical period. Vitality is needed in other channels. At this one epoch the body is more important than the mind; yet this is just the time that the girl is pushed the hardest in her educational career if she expects to pursue a course in high school or college. The women's colleges are increasing in numbers and importance, and have set the edu-

cational pace, as is the case with the men's colleges. While no one of intelligence questions the desirability of a thorough education for women, whether the training they get in their colleges is the best for them is an open question.

The most important problem is to conserve proper health and growth of children during the educational period. The large number of studies required and the pressure exerted frequently make this a serious question. Not only is depth sacrificed to extent of surface in this mental training, but there is too little time left for physical exercise and amusement. The pace has been set, and the children must keep up as best they may, and it is the colleges and higher institutions that are able to fix the standard. The secondary schools are directly influenced and dominated by the college requirements, and in their turn react upon the primary schools. So much ground must be covered by these advancing requirements that the children are crowded in every way. Instead of constantly raising their standards of admission, it would be better if the colleges could be induced to lower them in the interest of the health of the coming race.

HOURS OF WORK AND SLEEP FOR SCHOOL CHILDREN

Some years ago The Royal Sanitary Institute of Great Britain made a study of how much work could safely be put upon the growing child. The hours of work and sleep required during childhood and youth were tabulated as follows:

Age of pupils	Hours of work per day	Hours of sleep per night
From 5 to 6 years	1	13½
From 6 to 7 years	1½	13
From 7 to 8 years	2	12½
From 8 to 9 years	2½	12
From 9 to 10 years	3	11½
From 10 to 12 years	3	11
From 12 to 14 years	5	10½
From 14 to 16 years	6	10
From 16 to 18 years	7	9½
From 18 to 19 years	8	9

THE SCHOOL-ROOM AND APPLIANCES

As much of the child's time is spent in school, it is of great importance that the room and all its appliances should be conducive to health. Ventilation and light are of great importance. The complicated mechanical devices for deliver-

ing fresh air and removing foul air are now being superseded by a return to the simple cross ventilation from windows opening outside. Air in sufficient motion to cause a draft, however, should be avoided. By opening the windows at the top, or by placing boards between the sashes, a direct draft can usually be prevented. During recess, while the children are out, the air of every schoolroom should be completely changed by opening all the windows to their full extent. There will be sufficient window space if the window surfaces are about equal in combined area to one fifth of the floor area.

Each child should be provided with about twenty square feet of floor space and allowed at least from two hundred and fifty to three hundred cubic feet of air space. The windows should be placed as high as possible toward the ceiling for good light as well as ventilation. A northern light is generally preferable, but from whatever direction it comes, it should strike the book of the pupil from above and behind, and, if possible, from the left. Glaring sunlight is hard on the eyes, and any dazzling light may be avoided by window-shades made of some kind of gray material. The walls of the room are best

tinted with a shade of gray, and every part should be well lighted. The best temperature for the room during winter will be about sixty-eight degrees Fahrenheit.

POSTURE OF THE SCHOOL-CHILD

Many school-children do not hold themselves erect, but tend rather to a slouching posture. This may be due to too long confinement in one position or to the desks and chairs not being proper in size or shape. This may induce an undue curving of the back, with a contraction of the chest.

Anything that leads to a one-sided position for any length of time is undesirable. The desk may be too high or too low, and the chair may be placed too far back from the desk. The seat should be so placed that a straight line falling from the inner edge of the desk will strike the seat about an inch back of its edge. The seat for each child should be of the same height as the length of the leg from the foot to the knee, so that, when sitting, the sole and heel can rest easily on the floor. When the seat is too low, the body is bowed forward, and if too high, only the toes touch the floor, and a strain is thus put

on the whole body. Every seat should be single and slightly curved as an aid to comfort, with a back that curves slightly backward.

The rear edge of the desk should be about level with the elbow. If the desk is too high, the spine is thrown into a condition of lateral curvature. The top of the desk should slant slightly toward the pupil, so that the book will rest at an easy angle for reading. Correct posture on the part of a growing child is so important that the details here mentioned in reference to seats and desks should be carefully considered. If many hours each day are spent in unnatural or strained positions, the results cannot fail to be disastrous.

SCHOOL FURNISHINGS

The floor, furniture, side walls, and ceilings of the school-room should be as smooth as possible in order that no cracks for the collection of dust or dirt may exist. Wet or soiled outer clothing should not be hung in the school-room, as large closets exposed to the air or wide hallways should be provided with hooks for street clothing. In case of storm, children should not be allowed to remain in the school-room with wet

feet. This is a constant source of sore throats and chronic catarrhal affections.

THE RECESS

The recess is a very important feature of the school-day. For very young children it is desirable to have several short recesses, as their minds need frequent relaxation, and it is difficult and undesirable for them to concentrate except for short periods. They also tire of merely sitting still too long, and should be allowed frequent changes of position. This can be accomplished by standing, marching, or, preferably, by light gymnastics.

It is rarely desirable to start school attendance before the age of seven, and in some cases this may be too early. These very young children should not be confined for more than three hours daily, and even then there should be frequent intermissions.

THE SCHOOL LUNCH

For older children who remain during the full school-day the recess should be long enough to allow time for a comfortable meal. Most children are inclined to eat too hastily at all times

unless carefully trained to proper habits in this respect. It is particularly at lunch that the food is bolted in order to engage in play. Children may sometimes be seen playing tag, or engaged in violent exercise, with a sandwich in one hand, from which hasty bites are taken during a lull in the game. This cannot fail to result in dyspepsia, if nothing worse, and the many digestive troubles in later life frequently have their source in the faulty eating habits of the child.

When the home is near the school, it is better for the pupil to get a warm, comfortable lunch or dinner there, and sufficient time should be allowed for coming and going without the undue haste that is sure to impair digestion. If the distance is too great, it is better to have a warm lunch served at the school; but, if this is not possible, a basket lunch must be provided. As this has to be cold it is an advantage if a warm drink can be procured in addition, such as a cup of hot milk or cocoa or plain meat broth. In many cases even this is not feasible, and then the child must depend entirely upon the contents of the basket. It is accordingly very important that the food be carefully selected for its nutritive value, especially as this may be the

principal meal of the day. The tissue-building and heat and energy-producing foods — proteins, carbohydrates and fats — must be present in what is known as a properly balanced ration.

The following may serve as samples of school lunches, taken from one of the pamphlets of the United States Department of Agriculture:

1. Sandwiches with sliced meat for filling; baked apples, cookies, or a few lumps of sugar.

2. Slices of meat-loaf or bean-loaf; bread-and-butter sandwiches; stewed fruit; small frosted cake.

3. Lettuce or celery sandwiches; cup custard; jelly sandwiches.

4. Cottage cheese and chopped green-pepper sandwiches; or a pot of cream cheese with bread-and-butter sandwiches; peanut sandwiches; fruit; cake.

5. Hard-boiled eggs; baking-powder biscuit; celery or radishes; brown-sugar or maple-sugar sandwiches.

6. Baked-bean and lettuce sandwiches; apple-sauce; sweet chocolate.

Few parents appreciate the importance of the midday meal in the school-day as influencing the health and development of the pupils. Children

are sometimes furnished with a little money to supplement their lunch, and, if so, it must not be spent for pastries, éclairs, or cheap candy, but rather for some warm nourishing drink, as before mentioned, that will stimulate the stomach and increase the flow of the digestive juices.

COMMUNICABLE DISEASES IN SCHOOL

One of the constant dangers involved in the collection of children in schools is the spread of contagion from one to another. In many localities the school is the hot-bed for the spread of an epidemic. Diphtheria, scarlet fever, measles, and whooping-cough are the most common of the diseases spread in this way. Milder infections, such as chicken-pox and mumps, may also be mentioned, as they sometimes give a good deal of trouble.

If an epidemic is severe and wide-spread, it is often better to close the school entirely. Each of these diseases has what is known as a period of incubation, in which the virus, while present and preparing for greater activity, cannot be transmitted from one to another. Children who have been exposed to any infection, or who are ailing from some unknown cause, should not be

sent to school until the cause of the illness is apparent. Ordinary colds and influenza are also spread largely by schools, and children should always be kept at home and apart from others during such attacks. They should be taught while coughing and sneezing always to cover the nose and mouth with a handkerchief, as the spray thus produced spreads about in the air and is highly infectious.

When one child in the family is suffering from a contagious disease, it is wiser to keep any other children at home, as is now usually required by boards of health, fearing they may be in the period of incubation and thus suddenly attacked during the school session. It is now known that some persons may be carriers of disease germs without themselves succumbing to the illness. If, however, well children are at once removed from a house in which a contagious disease exists, and taken to some other domicile, they may usually safely return to school at the following intervals:

Diphtheria, seven days after immunization and two negative cultures.

Scarlet fever, seven days after a thorough disinfection and entire change of clothing.

Measles, two weeks after the last exposure.

Whooping-cough, eighteen days after the last exposure, if no cough.

Chicken pox, eighteen days after last exposure.

Mumps, after three weeks from inception of primary case.

Children who are known to have been directly exposed to a communicable disease need not be excluded from school during the first part of the possible period of incubation. This results in quite a saving of time. This period of time, which begins with the day the child was last exposed, is as follows: Chicken-pox, exclude from school from the eleventh to the twenty-second day; measles, from the eighth to the fifteenth; German measles, from eleventh to the twenty-second; mumps, from the fifteenth to twenty-second; smallpox, twenty-two days, unless the child has been successfully vaccinated within a year, in which case he may return at once.

In all cases a careful physician or board of health official must decide when it is safe for the child who has had contagious disease to return to school. Care should be given to this by parents, teachers, and physicians, as children are sometimes handicapped for life as the result of

contagion contracted during school-years. More facts as to the methods of avoiding communicable affections will be given in the chapter on health and disease.

SCHOOL ATHLETICS

Plenty of outdoor exercise is required by the growing child in order to lay up a store of vigor for future use. While a certain amount of indoor gymnasium exercise may be valuable, nothing is so beneficial to the boy or girl as play in the open air. The wider recognition of this lack cannot but result favorably to the coming generation. In certain lines, however, there may be danger of carrying exercise too far, especially during the period of adolescence. This is shown in the craze for athletics seen in many schools and colleges. The outcome of this excessive interest is a few overdeveloped athletes and a majority of students barred out entirely, owing to the high physical standard required for great competitive contests. It is very questionable whether more physical harm than good does not eventually come even to the athletes themselves. The terrible strain put upon the vital organs, especially the heart and lungs, involved in these

close competitive struggles, is sometimes followed by lasting ill effects. The excessive development of the muscular system in a person who is shortly to settle down to sedentary pursuits may end in disastrous results. The blood that should nourish the vital organs is appropriated in the building up of powerful and useless muscles, and the result is a loss to the general vitality. This may explain why some strongly formed athletes fall victims to consumption. The proper functioning of what may be called the great vegetative organs, such as the heart, lungs, and liver, are the important prerequisites to health and long life, and not enormous muscles which are not put to constant and special uses. A system of physical training that devotes excessive attention to the few, and hence cannot give a careful study to the necessary all-around development of the many, is not a proper system and does not make for general and widely diffused health and vigor. Reference has already been made to the faulty posture so often seen in school children. Athletic trainers in schools and colleges should give special attention to this defect. A correct poise can be attained by a little practice at this time which will last all through life. The chest should be

carried high and arched forward, with the shoulders held squarely back, the neck straight, and the chin forced in, and the abdomen also held firmly in. Such a carriage, accompanied by deep, full breathing, will make both for health and grace. Contrast such a physical poise with the slouchy position so often seen in men and women; the difference is startling. It is the difference in appearance between a West Point cadet and an undernourished, poorly developed street boy.

Young men or women, however plain of feature they may be, can become attractive to look upon by simply holding themselves erect and in the proper posture.

CHAPTER VI

HEALTH FOR THE MIDDLE-AGED: CONSERVING LIFE

PERHAPS the most useful and important time of life is included in what is popularly known as middle age. The period of growth and preparation for life has now been completed, and the time of achievement is at hand. If the handicap of ill health occurs, the effects are most disastrous. Many men and women who have started out with brilliant prospects have ended in failure because their strength has not held out.

After the period of growth is completed, health, efficiency, and length of life depend largely upon the proper management of middle age. The longer this time can be continued, the longer will the period of decline be averted, and the slower will be its course when it does come. At birth a certain amount of potential vitality is given to each person by his ancestors. This may be to a certain extent increased by a healthy growth, but when this has been attained, the

physical effort of the man or woman must be largely in the line of conservation. If this is properly done, even those who are handicapped by not possessing vigorous health may frequently enjoy long and useful lives. The fundamental rule for each person is to find out his or her physical limitations and keep within them.

A long and healthy life thus depends to a certain extent upon the management of middle age. One must now cease to be a spendthrift in health and vigor. After the period of growth and expansion, the time for careful conservation of health and energy has arrived. Even people who have not had the best start in youth may frequently enjoy long and healthful lives by extra care during this middle period.

It has been said that the best way to insure a long life is to have an incurable disease. This means, of course, that extra care in looking out for one's health is always rewarded, and in the case of persons with poor vitality this care may be shown by increased longevity.

FOOD AND DRINK

With reference to food, several useful rules may be considered. Most adults eat larger

amounts than are really required by the body. All that is needed during middle age is sufficient nourishment to repair any waste of tissue and maintain the heat of the body, as the building-up process has now been accomplished. Every age should take the food that is specially adapted to its needs. An excessive amount of meat is not desirable during middle age. A little knowledge of physiology will explain why this is so. In the first place, this kind of nutriment consists largely of protein, which is the tissue-building element of food. As growth has now been completed, a large amount of protein is not required, but only enough to repair the waste of tissues entailed by the processes of life. Animal protein that is not completely utilized must be excreted as a waste product by the kidneys, and disorder of these organs is largely prevalent in middle life. Fresh fish affords a wholesome and digestible protein, sometimes more desirable than meat, though the idea that fish is a sort of food for the brain and thus stimulates intellectual power has no real scientific basis. Eggs give a concentrated and usually very digestible form of animal protein. Vegetable protein, contained in such vegetables as peas and beans, is not so apt

to cause irritation of the kidneys nor so liable to be followed by decomposition in the bowels.

A properly balanced diet at this period of life will thus call for a moderate amount of meat, with plenty of fresh vegetables and a moderate supply of cereals. Sugar in excess should be avoided as it is not apt to be well tolerated in middle age. Fruit of all kinds can be indulged in freely, as the mineral salts and acids thus ingested have a beneficial effect. A liberal amount of fruit and vegetables, by means of the cellulose or undigested fiber they contain, is favorable to a proper functioning of the bowel, which is apt to be sluggish at this period of life, particularly in women. These unirritating waste products give a sort of ballast to the bowel and, by distending it, tend to free its action. The intestinal sluggishness of adults who lead sedentary lives is often encouraged by taking too concentrated foods; most of these, by being absorbed, do not leave enough bulk to properly stimulate the intestine to action.

What is true of food is also true of drink. Stimulating foods and stimulating drinks must be taken with great moderation. The latter are specially exemplified by the usual alcoholic

drinks. Most adults will do better without their steady and constant use. The principal disadvantage of the continuous employment of alcohol is that it tends to raise the blood pressure as well as induce too great a deposition of fat. Weak and anemic persons, however, may derive benefit from a moderate amount of alcohol, especially such as is contained in malt liquors and the lighter wines. People with a marked neurotic inheritance or constitution should not take alcohol in any form, as this is the class most apt to form the habit.

Coffee and tea in moderation are great comforts to many people during middle age. Some care may be necessary to avoid too strong infusions as well as too frequent indulgence. A few people may have an idiosyncrasy against them, especially coffee. The active principle is the same in both tea and coffee. The former is somewhat different from the latter in other things beside flavor, especially in its content of tannin. The scare advertisements by those having substitutes for sale may occasionally contain a little truth, but their statements are nearly always gross exaggerations, if not actual falsehoods.

A cup of hot milk is a good substitute for tea or coffee if these seem to disagree. Sometimes a slight trace of either tea or coffee added to the heated milk — just enough to bring out a little of the flavor — gives satisfaction to those who do not like the taste of milk. Cocoa is also a good substitute in some cases. Occasionally those who cannot drink plain milk without disturbance can take sour milk, such as buttermilk or one of the fermented milks. The lactic acid contained in these preparations aids digestion by destroying putrefactive bacteria in the bowels, and the curd, by being finely divided, is easily digested.

One of the cheapest and commonest drinks that makes for health — plain water — is too often neglected. Many people do not take sufficient water to maintain health. Not only does water form a large bulk of all the tissues, but it constitutes the great solvent required by the body. The processes of life are continually producing poisons that must be eliminated quickly if health is to be conserved. If water is lacking in sufficient amount to keep these poisons in solution, the emunctories cannot properly carry them out of the body. A glass of pure water on

rising, one or two during the day, and another on retiring will supply sufficient of this fluid for health. It is much better to drink water in this way than with the meals. It is not wise to drink much water, especially iced water, with meals, as the stomach is thus chilled and the digestive fluids diluted. The gouty and other poisons often produced during middle age tend to be flushed out of the system by a free supply of water.

Tobacco, like tea and coffee, has a mildly stimulating — or to some a sedative effect — when used in moderation. While the active principle, nicotine, is very poisonous in large doses, experience shows that it is certainly not harmful if used in moderation. Tobacco is, however, very irritating to some persons, and they should not use it. In these cases, or when used in excess, a disturbed rhythm of the heart, nervousness, digestive upsets, and throat irritation may be noted. If one cannot maintain moderation in the use of tobacco, it should not be employed at all. Every one must be a law to himself in this regard. Nothing is gained by indiscriminate condemnation of a habit that may

often help one over the many rough places of life.

ILL EFFECTS OF STOUTNESS

As middle age advances, many persons tend to put on flesh, and if this goes beyond a certain point, it does not make for health or resistance. When the waist-line bulges beyond the chest-line, the prospect for a long and vigorous life diminishes in direct proportion as the former outstrips the latter. The insurance companies long ago recognized this fact, and have established a ratio between the weight and height of the person beyond which they will not accept a risk.

The following weights, in light clothing, have been approximately established as proper for the heights at the period of thirty years. This age is selected because full growth and maturity have then been reached.

For Men—	5 feet	126 lbs.
	5 feet 4 inches	136 lbs.
	5 feet 6 inches	144 lbs.
	5 feet 8 inches	152 lbs.
	5 feet 10 inches	161 lbs.
	6 feet	172 lbs.

For Women—4 feet 10 inches.....116 lbs.
5 feet .....120 lbs.
5 feet 2 inches.....124 lbs.
5 feet 5 inches.....134 lbs.
5 feet 8 inches.....146 lbs.
6 feet .....161 lbs.

As age advances, the aim should be not to increase any more than is possible beyond these weights. Diet and exercise must be carefully employed with this end in view.

To avoid excess of stoutness, the greatest care must be exercised in eating. The first point to observe is to eat sparingly or in great moderation. The food principles that tend to conversion into fat must be avoided. Thus starches, sugars, and fats of all kinds should be largely cut out of the diet. Some vegetables, like potatoes, consist chiefly of starch, but others, like the green and succulent ones, have very little of this fat-forming element. As examples of the latter, string beans, spinach, celery, tomatoes, and greens of all kinds may be freely eaten. Bread made of gluten or bran may displace the ordinary white bread. All fluids should be taken sparingly. Thus soups should not be put on the menu, and no water or other fluid should be taken

with meals. This applies particularly to alcoholic beverages, and especially to malt liquors, such as ale and beer. If any stimulant is taken, a thin acid wine will be the best.

UNDERWEIGHT

Although the usual condition of middle age is to increase in weight, there are some persons, particularly those with a tubercular tendency, who weigh less than normal. In these cases, every effort should be made to put on flesh. It is found that better strength and resistance will ensue when the body frame is suitably padded. To this end, the fat-forming foods must be taken in abundance. This means the free administration of butter, cream, cod liver oil, olive oil, fat bacon, and the fatty meats; also the giving of plenty of starches and sugars. Fluids, such as rich soups and milk, also tend to put on weight. In the process of forcing nutrition, an extra strain is put on the digestive powers and an occasional upset will probably result. This may be reduced to a minimum by carefully graded exercise and plenty of rest with baths and hygienic living. Insomnia may form an accompaniment of under nutrition, which, in turn, is much aggravated by

such a habit; while, as a rule, natural sleep will come best with an empty stomach, some easily absorbable nourishment will often help to induce somnolence by drawing the blood from the head to the stomach. A cup of hot milk or meat broth on retiring may serve such a purpose, while, at the same time, aiding the general nutrition. A tepid or warm bath, followed by slow, deep breathing in a monotonous fashion may also help in inducing sleep.

HEALTHY EXERCISE

A proper amount of exercise will help to maintain health during middle age. The violent exertions of youth, however, must be avoided. It is enough to make the judicious grieve to see a stout, middle-aged gentleman jumping about in the hot sun in a strenuous game of tennis. The strain on the heart and blood-vessels may have a very disastrous effect. Golf, on the contrary, need not call for such violent exertions, and hence is well adapted to this time of life. Horse-back-riding is also very beneficial to some, as the motion tends to shake up the liver and other internal organs, and thus favors their functioning. Mild gymnastic exercises do well, but

heavy lifting or the use of large dumb-bells or Indian clubs ought to be avoided.

Although carefully regulated exercise in a gymnasium, if not too violent, is frequently beneficial, this involves time, preparation, and change in dress which is hard for the busy person to take. The greatest benefit from exercise comes from its frequency and regularity. It is astonishing how much benefit may be obtained from very short periods, even five minutes, if engaged in daily. Light calisthenics on rising will fill this requirement. No apparatus is required, but simply a free movement of the various muscles of the body. This may easily be accomplished by standing erect and swinging the arms at all angles, by bending the body forward and backward and from side to side, by swinging the body forward until the hands touch the feet, by moving each leg from side to side and forward and backward, and by rotating the hips. With a little thought and practice, all the voluntary muscles of the body can thus be brought into easy play. If desired, very light dumb-bells or Indian clubs will increase the vigor of the exercise.

These movements put no strain upon the heart or blood-vessels, and will improve the general

muscular tone. Thus they may accomplish much in keeping the body supple and shapely. In following a cool, tepid, or hot bath, they put the body in a glow that will give a good physical start to the day. Little time is lost, and the regular hour being appointed and kept, the course can be carried out from year to year to the great benefit of the sedentary worker. No teacher is required, and it is safer and saner than the occasional spurt of exercise under the direction of some professional athlete. The latter is not capable of examining or knowing the condition of the heart, blood-vessels, and viscera of their pupils, and much harm is sometimes done by the vigor of their teachings. Before putting themselves under the care of these athletes, the candidates for such a course should always be examined by a capable physician.

Dr. W. G. Anderson, the director of the Yale gymnasium, has recently given a few simple exercises for the average man who has neither time nor opportunity to go to a gymnasium. Although having easy access to the most complete appliances for physical exercise, he believes that weight can be reduced and the body kept in good condition in a very simple manner. The only

apparatus used is the edge of a door and a small horizontal bar in the doorway of the bedroom. The exercises can be taken while dressing in the morning or at any odd time. They consist in arching the chest fully, throwing back the abdominal walls, and holding this position for sixty seconds. This widens and deepens the chest and strongly develops the front and side abdominal walls, and also brings the spinal muscles and the diaphragm vigorously into action. Next, several times a day lean against a desk and gently bend the body backward and forward. Stand against the straight edge of a door, press the neck against the collar, arch the chest, and force back the abdominal walls, touching most of the back to the door. Hold this for sixty seconds, but take it three times a day. At night, if the condition is normal in other respects, hang from the small bar and gently swing the body; later practise raising the knees while hanging. If the heart and lungs are fairly normal, and the blood pressure not too high, practise rapid walking with vigorous arm swinging. Ordinary walking is a reflex or automatic exercise and thus physically inexpensive. Walk more and swiftly, and ride less.

The various forms of falling of the viscera, due to an accumulation of fat, are greatly benefited by the simple abdominal gymnastics mentioned above, and at the same time the contour of the abdominal region becomes quite normal.

Bad effects upon the health of middle age are sometimes seen in cases where young men in college or elsewhere have been in prolonged training for competitive athletic events that have suddenly been abandoned for a sedentary existence. The enlarged heart and muscular system of these persons fare badly when a period of complete inaction takes the place of the former strenuous exercise. Young athletes should never suddenly or completely break off muscular exercise.

It may finally be added that walking in the open air, with head and chest erect and deep breathing, accompanied by swinging of the arms, is, after all, about the best, as it is certainly the cheapest, form of exercise that is available to all.

The immense conflicts of modern warfare, with the tremendous drain of younger men to fill the ranks, may cause a reorientation of our ideas as to the possibilities inhering in later years, even on the physical side. It has been estimated that there are fully eight million men between

the ages of forty-five and sixty-five in this country. If this large body can be put and kept in good physical condition, our opportunities for protection and defense can be indefinitely extended. Acting on this idea, a senior service corps has been proposed by Walter Camp, who has organized an experimental body of this kind. It is intended to have the corps consist of men over military age who wish to be of service to the country and who are willing to act as a body. The only qualifications are citizenship and the passing of a simple physical examination. The organization should include, in addition to the usual officers, a surgeon or physician to watch the condition of the men, and a leader competent to direct the work and keep up the interest. The work is to consist of ten or fifteen minutes of simple calisthenics or setting-up exercises, and forty-five to fifty minutes outdoor drill, hike or march. The men are to agree to give an hour a day for three days in the week, and the signing-up period is for ninety days. No special attempt is intended to radically change the habits of life, but heavy, rich food is to be eliminated, together with excessive smoking, and the cocktail is to be forbidden altogether. This

interesting movement is not only promising from the point of view of increasing health, but it will prove a valuable factor in national defense.

WORK AND PLAY

Many people, particularly men, work too hard and too continuously for the good of their health. The close competitions of business life often call for an exhausting output of energy. Hence it is important to remember the old adage that "All work and no play makes Jack a dull boy." Not only efficiency, but continued good health, requires a proper amount of recreation. It is real economy to devote a certain amount of time to outside pursuits that may amuse and make for health. Here is where the mental change and rest that comes from some hobby is beneficial to the busy person. Anything from chopping wood to riding a bicycle, from golf to fishing, from skating to swimming, even dancing, will do. Gardening or motoring are good outdoor recreations. Games or music within the home also tend to get one out of the grind, as well as the various collecting hobbies. We must always remember that pleasant mental interests and diversions have a directly good effect upon health.

All tend to check the worry and distraction that is the bane of modern life in lessening both health and efficiency. Worry has a much more depressing effect than the hardest work, as it both depresses the nervous system and lowers the vitality. When one's efforts in any line are unsuccessful, it is hard to avoid worrying, but this only lessens the chances of ultimate success. Even very difficult labor, if successful, rarely breaks one down. It is the addition of worry, when the outcome is uncertain, that makes such work difficult to bear. The strain of middle life is best borne when a cheerful spirit is cultivated, and this, in addition, will do much to conserve health and vitality.

INCREASED MORTALITY OF MIDDLE LIFE

The great importance of this subject is shown by the fact that the mortality of middle age is on the increase in this country. In a recent bulletin of the New York Department of Health the disquieting fact is shown that, whereas the expectation of life at birth is now about ten years greater than it was thirty years ago, the adult of forty years or more has a shorter expectation of life than formerly, the decrease amounting to a

year or more, according to the age. This shows that most of the health work in recent years has been directed to the saving of infant and child life, while virtually nothing has been successfully done to prolong adult life.

The following table shows the different expectation of life at recent periods as compared with some previous years:

TABLE A

Approximate Life Table, Trienna 1879–1881 and 1909–1911, Based on New York City Statistics

Ages	Expectation of Life, 1879–1881	Expectation of Life, 1909–1911	Gain (+) or Loss (—) in Years of Expectancy
Under 5.	41.3	51.9	+10.6
5– 9...	46.3	51.1	+ 4.8
10–14...	43.8	46.9	+ 3.1
15–19...	39.7	42.5	+ 2.8
20–24...	35.8	38.3	+ 2.5
25–29...	32.6	34.3	+ 1.7
30–34...	29.6	30.5	+ 0.9
35–39...	26.7	26.9	+ 0.2
40–44...	23.0	23.4	— 0.5
45–49...	21.1	20.0	— 1.1
50–54...	18.3	16.8	— 1.5
55–59...	15.4	13.9	— 1.5
60–64...	13.0	11.3	— 1.7

Ages	Expectation of Life, 1879–1881	Expectation of Life, 1909–1911	Gain (+) or Loss (−) in Years of Expectancy
65–69...	10.5	9.1	— 1.4
70–74...	8.9	7.2	— 1.7
75–79...	7.3	5.5	— 1.8
80–84...	6.4	4.3	— 2.1
85.....	5.5	2.2	— 3.3
		Balance.....	+26.6
			—16.6
			+10.0

A somewhat similar table taken from figures for the United States registration area shows that this condition is not confined to New York City, but maintains a fair average for the country at large:

TABLE B

Comparison of Mortality of Males and Females, by Age Groups. Death Rates per 1,000 Population. (Registration States as Constituted in 1900)

Age.	Males 1900	Males 1911	Per Cent Increase or Decrease	Females 1900	Females 1911	Per Cent Increase or Decrease
Under 5	54.2	39.8	—26.27	45.8	33.3	—27.29
5– 9	4.7	3.4	—27.66	4.6	3.1	—32.61
10–14	2.9	2.4	—17.24	3.1	2.1	—32.26
15–19	4.9	3.7	—24.49	4.8	3.3	—31.25

Age.	Males 1900	Males 1911	Per Cent Increase or Decrease	Females 1900	Females 1911	Per Cent Increase or Decrease
20–24	7.0	5.3	—24.29	6.7	4.7	—29.85
25–34	8.3	6.7	—19.28	8.2	6.0	—26.83
35–44	10.8	10.4	— 3.70	9.8	8.3	—15.31
45–54	15.8	16.1	+ 1.90	14.2	12.9	— 9.15
55–64	28.9	30.9	+ 6.92	25.8	26.8	+ 0.78
65–74	59.6	61.6	+ 3.36	53.8	55.1	+ 2.42
75 and over..	146.1	147.4	+ .89	139.5	139.2	+ 0.22
All ages	17.6	15.8	—10.23	16.5	14.0	—15.15

Although this table covers a period of only eleven years, the correspondence between it and the life tables for New York City is remarkable.

It has been found that the increased mortality of middle age is due principally to diseases of the heart, arteries, kidneys, and cancer. While the cause of cancer is not yet thoroughly understood, the other conditions that increase the mortality at this period can and should be corrected. It is believed that improved hygiene in regard to food, exercise, and habit of life may be initiated, and a beginning made to check the increasing mortality of middle life.

CHAPTER VII

HEALTH FOR THE OLD: PROLONGING LIFE

SOME years ago, during a celebration at Johns Hopkins University, William Osler made a casual remark in reference to the ages at which different kinds of usefulness were lessened, if not brought to a close. The two periods of forty years and sixty years were mentioned in this connection. He thought that the greatest productive work usually ceased at the age of forty, and efficiency of another sort might end at sixty. He believed that the effective, moving, vitalizing work of the world was done between the ages of twenty-five and forty.

The doctor was speaking to an audience consisting chiefly of medical men, and he may have had in mind the fact that such work as is required in the laboratory, with the prolonged strain of the eyes and the constant use of the microscope, could not continue very long, and that certain kinds of hard professional life should not persist over sixty.

Whatever may have been in his own mind, however, the general public got the idea that a high medical authority believed that after forty the best productive years of life have passed, and that at sixty the active working years are over.

It was one of those remarks that come at a psychological moment. The idea spread like wild-fire. The papers were full of it, and the comic journals had pictures and suggestions of chloroform being quietly administered to the decrepit man at sixty, and a new verb, to "osler-ize," was coined to describe the process. This single unwitting remark has done a tremendous amount of harm. It came at a time when there was a marked tendency to speed up in all kinds of work. Business and professional life were carried on at needlessly high pressure both for prolonged efficiency and continued health.

If the real working years of life are to be so short, this needless hurry should be increased rather than lessened. Another unfortunate effect was that large employers of labor, both manual and mental, began to look askance at people who were passing middle age.

No matter how efficient the man, renewed employment now becomes almost impossible when

the hair has turned gray. All sorts of pathetic subterfuges are employed by aging men to conceal the ravages of the years. They know that in the present state of the public mind there is little hope or chance in the battle of life for the man approaching old age. Some of the newspapers have recently discussed gravely the possibility of utilizing elderly clerks and business men as office boys, with the idea that their reliability will compensate for other kinds of disability.

It is high time to consider how much truth lies in this opinion, and, if it is erroneous, what can be done to induce a sounder public belief. There is no doubt that, if properly directed and controlled, the decade between sixty and seventy should be the most fruitful and useful period of life. This satisfactory condition, however, depends, above everything, on a fair state of health.

Every period of life naturally lays a special emphasis on different kinds of usefulness. A man or a woman at forty should be able to do some things better than one at twenty, and at sixty or seventy better than one at forty or fifty. It is particularly in ripe judgment and

the ability to see things in their true relations, having a proper perspective, that the later years of life should excel. Persons and races no longer fight competitive battles with their muscles, but with their brains. A large number of the mistakes and calamities of life come from the callow judgment of immature minds.

CONSERVING HEALTH

The most important question of the day is how to conserve health and strength in those whose judgment and experience are necessary to carry civilization to its highest point. If vigor can be preserved until late in life, there will be a great saving to society of valuable effort. At the outset we repeat that if a person lives to be sixty and is then in a fair condition of health, there is really no good reason why such a life should not be usefully prolonged until eighty or ninety. If one reaches the beginning of old age without any vital organ being seriously crippled, useful life should be continued for a long space of time by the exercise of a little additional care.

The declining period of life, while not the most vigorous, should be healthful and serene. It fre-

quently happens, especially in the case of women, that this is the most comfortable time of life.

Many deaths in advancing life are really due to the fact that one of the vital organs is inherently weaker than the others — has a shorter life limit — and hence succumbs to disease from poor resistance, or simply wears out. It may be the heart, lungs, or kidneys that exhibit this shortness of life, but the results are the same.

If the person passes through middle age without evincing special weakness in any vital organ, it shows that his life should be a long one, as he is built on the principle that Holmes exhibited in his inimitable poem entitled the "One Hoss Shay." This remarkable vehicle was so uniformly well constructed that it gave way all at once and fell to pieces without a preliminary rattle or jog. The end of the human body should be like the passing of the wonderful "One Hoss Shay," that lasted one hundred years and then —

> "Went to pieces all at once—
> All at once and nothing first—
> Just as bubbles do when they burst."

There is no principle, with scientific basis, that necessarily limits life. If we compare man with

other mammals, the life of the former is shorter than it should be. Thus the average duration of life of mammals, apart from man, is five times the period of growth. If this rule were applied to man, he should live about one hundred years. It is a very serious question why man should fall so much below other mammals in this respect. Much of the valuable experience of life is lost by its being brought to a close too soon.

If longevity can be made to increase, the whole span of life will be conserved, as youth and middle age will then gain ground on old age. If, as Professor Irving Fisher believes, forty-two per cent. of the deaths in this country might be postponed, and if each delay could save the country, as has been estimated, seventeen hundred dollars, the annual unnecessary national loss of capitalized net earnings would amount to about one billion dollars. The same authority estimates that we may safely say that the working powers of half the population is impaired ten per cent. by poor health. The conservation of health and strength as age advances offers a very important question for solution. The physical deterioration that comes with advancing years can be almost indefinitely retarded in many cases by a

careful observance of hygienic laws that should govern this period.

BODY CHANGES DUE TO AGE

Let us now briefly inquire what the bodily and mental changes are that occur as age advances. Perhaps the most marked is a hardening of the tissues. The general framework of the body consists of a substance known as connective tissue. This fibrous material incloses, supports, and penetrates all the vital organs, as well as the bones, muscles, and arteries. As age advances there is an increase of this connective tissue at the expense of the more highly vitalized tissues of the body. The cells of the various organs, such as the heart, liver, and kidneys, are compressed by the increasing connective tissue, and hence do not function so well as in earlier life. There is also a slow hardening of the arteries, with a consequent loss of elasticity in their walls that is due to the same cause. The blood-vessels also grow more brittle because of an increased retention of lime. The body-cells of old people, as well as their blood, seem to have a marked affinity for lime. One result is that the bones are much less elastic than in the

young persons and hence break more easily.

As a result of the thickening of the arteries, the blood is not distributed as well as it should be to the various organs of the body, and consequently there is a gradual weakening of function.

Another of the lower grade of tissues, fat, often increases with years, but in extreme old age there is usually a wasting because of the shrinking of all the tissues. The cells of the body then tend to become sluggish.

The first effort of every person should be to postpone these changes as long as possible and, when they do occur, to regulate one's life accordingly. These bodily changes take place much more rapidly in those who have suffered serious illnesses. Hence the care of the body in previous years and continuous good health favor longevity. Nearly every serious disease, even when followed by apparent complete recovery, leaves some lesion or change in the part affected that later may cause trouble. Preventive measures beginning at forty, or even earlier, may be necessary in order to conserve the health of later years.

There are many minor ailments that by con-

stant repetition undermine vitality or lead to serious illness. Healthy old people have usually been fairly free from illness during their earlier years.

DIET AND HYGIENE

In the decline of life, great care must be exercised in avoiding undue stress and strain if living is to be prolonged. The diet must be very simple, digestible, and moderate in amount. Too much work put upon the digestive, assimilative, and excretory organs is specially disastrous. Not only is a large amount of nutriment unnecessary, but the organs destined to throw out the waste are thus overworked, although they themselves are beginning to degenerate. If put to a needless strain, this natural degeneration is much hastened and aggravated.

Violent exercise and needless exposure are also to be avoided. It is a true saying that a man is as old as his arteries. When these vital tubes begin to lose their elasticity, it is time to avoid putting any strain on them. Here is where many widely advertised schemes of physical exercise are likely to do incalculable harm to those who are advancing in years. While gentle and systematic exercise is often beneficial late in life,

it should be carefully graded and based upon the known conditions of the heart and blood vessels.

Careful attention to food and hygiene will do much to prolong life as well as make a comfortable old age. With reference to nutriment, it must be remembered that the old do not require so much food as younger people, and digestion and assimilation are both slow and comparatively weak.

Sometimes food cannot be properly chewed, owing to defective teeth, and softer food should then be taken, as lumps of undigested food undergo putrefaction in the bowels and cause much disturbance. As digestion is slow, food should not be taken between meals. A five-hour interval will give the stomach a chance to empty itself. Meat should be taken in great moderation and is often best digested when a little under done. If the teeth, either natural or artificial, do not work well, meat and similar foods should be finely chopped before being eaten.

The heat and energy foods, such as fats, starches, and sugars, may be freely given. Sweet oil, butter, and bacon are among the most easily digested fats of this kind. All the cereals, potatoes, and green and succulent vegetables are

likewise good. The more bulky vegetables, containing much fiber or cellulose, such as carrots, cabbage, sweet potatoes, or celery, often have a good effect by giving a ballast to the bowel.

The lower digestive power of the stomach, with weakened gastric juice, may cause a craving for sour, salty, or savory articles, which should be gratified to a certain extent, as they stimulate the stomach to greater effort. The more insipid foods, usually alkaline, may not be digested so well as those more highly seasoned. Excess in this direction must, however, be avoided. Constipation, with decomposition of the intestinal contents, is often a source of great trouble to old people.

METCHNIKOFF'S THEORY OF AGE

The well-known theory of Metchnikoff may here be mentioned. This great scientist believed that old age is in itself a sort of disease produced by the continual absorption of poisonous products from the large intestine. He taught that this auto-intoxication from the large intestine produced the slow changes in the tissues that we have previously noted as accompanying old age. As putrefactive germs do not thrive in an acid

medium, he recommended that lactic acid — the acid of sour milk — be freely given to kill off the harmful germs. The various germs that produce lactic acid may also be taken, accompanied by a little starch or sugar, which are necessary to nourish them.

As proof of his theory, Metchnikoff pointed to the fact that certain races that partake freely of sour milk live to a great age, but he never succeeded in convincing scientists that he had really found the potent cause of old age. In order permanently to change the flora of the large intestine, it would probably be necessary to start with the infant and administer these sour milks throughout life. The sluggish action of the bowel, however, favors the absorption of ptomaines and other poisons, and should be avoided as much as possible.

Laxative foods, especially those that leave a bulk in the bowel, are favorable to its action. Prunes, figs, fresh vegetables, whole wheat, bran, and most fruits may here be advised.

INTESTINAL STASIS

A treatment much in vogue at present for intestinal stasis consists in the administration of

one of the heavy paraffin oils. These preparations are not absorbed and act mechanically in sweeping out the intestinal tract. A tablespoonful once or twice daily is usually sufficient. A Japanese seaweed product known as agar-agar also acts mechanically in cleansing the intestine by means of bulk from the water it absorbs, and it is sometimes very effective.

THE USE OF LIQUIDS

In the way of drinks, water, weak coffee, tea, cocoa, buttermilk, the fermented milks, and small quantities of hot milk are advisable. It is usually not best to consume large amounts of cold milk, which is often constipating, and may form large masses of casein in the bowel that are hard to expel. Mild alcoholic stimulants are often beneficial, such as the light wines or malt liquors, which act by improving the digestive powers and sustaining the circulation in old age. Wine is sometimes called the milk of the aged. The sweet and strongly alcoholic wines, such as port or Madeira, do not serve as well. When there is great weakness, a mellow, old whisky, well diluted, may have a quick effect.

As a general rule, it is not well for old people

to eat heartily before sleeping, as insomnia and increased blood-pressure may thereby result. This is the reverse of what may be true in younger subjects, who sometimes sleep fairly well on a full stomach.

The general subject of the diet for the old was well epitomized many years ago in a quaint aphorism by George Cheyne:

> Every wise man, after fifty, ought to begin to lessen at least the quantity of his aliment, and, if he would continue free of great and dangerous distempers and preserve his senses and faculties clear to the last, he ought every seven years to go on abating gradually and sensibly, and at last descend out of life as he ascended into it, even into the child's diet.

PHYSICAL AND MENTAL EXERCISE

A moderate amount of exercise is beneficial, but it should never be carried to the point of fatigue or exhaustion. Above all, any form of exercise that leads to shortness of breath should be promptly abandoned. Driving or walking in the open air is the best and most available relaxation, and very mild calisthenics on rising are sometimes helpful.

Mental exercise and stimulation should always

be kept up. This tends to keep the body alert as well as the mind. Statistics show that in every community professional and business men who work principally with their brains are the longest-lived. Congenial amusements are also very desirable, especially those that divert the mind. Many people as they grow old become very self-centered. This leads to a constant study of symptoms and a selfish lack of interest in anything not subjective. This is both a cause and an effect of senility. A change of scene and occupation may prevent or alter such a condition of mind in those who are growing old rapidly.

REST AND SLEEP

While a proper amount of activity should be encouraged, plenty of rest and sleep is desirable. A nap during the afternoon is refreshing, but old people do not require so many hours of sleep at night as when engaged in the active work of life.

As people grow older, they become very sensitive to cold. This is due to two causes, a lessening of the power of heat-regulation within the body and a poorer circulation of the blood on the surface. They do not often run a fever except

from excessive irritation, and a beginning illness may not be recognized owing to this peculiarity. The skin must be carefully protected from cold by woolen underwear. In winter this must be thick and warm, as it is more beneficial to protect thoroughly the immediate surface of the body than to pile on heavy outside wraps. The extremities of the body are specially sensitive, and cold feet and hands must always be prevented.

SUSCEPTIBILITY TO DISEASE

While the general vital resistance is poor in old age, susceptibility to infection, strange to say, is much less marked than in earlier years. The body seems to be better able to resist bacteria and other disease germs; hence infectious diseases are rare, and, when present, usually run a mild course. Most affections tend to take a subacute course that renders them likely to be overlooked, especially in the early stages. This is markedly true of pneumonia, which is apt to attack old people in a most insidious form, with little cough or fever, but accompanied by great prostration. Thus will serve to emphasize the importance of carefully protecting the body from

undue exposure as age advances. If this were more carefully done, many useful lives would be prolonged.

In a consideration of the subject of age and old age we are, after all, dealing with relative terms. Age is really measured not so much by years as by the condition of the tissues. When degenerative changes have taken place in the body, old age has begun. In this aspect some people are older at fifty than others are at seventy. Some are even old at forty, and others may be well preserved at eighty.

The factors that keep the body young are a good heredity, hygienic living, and the absence of constitutional diseases that hasten the degeneration of tissues. We cannot help our heredity, but we can try to improve on it by extra care in our environment, especially as age advances.

There is no doubt but every one has the power to prolong life and keep it in useful operation by a proper understanding of the conditions that make for such a result.

We must not confuse senility with old age; the former means an excessive deterioration of tissues, leading to great helplessness, while the latter refers only to the passing of the years.

It is easy, by a glance at the history of the world, to see how much has been accomplished by persons who have reached the declining period of life. Dorland, in an interesting and exhaustive study published in a little book entitled "The Age of Mental Virility," finds that many of the finest achievements in business, statesmanship, literature, and all other activities have been wrought by men long past sixty. In looking over the whole field of life, he finds that most of the masterful achievements of the workers and thinkers of the world in all fields have been made by men working in the decades from forty to seventy. This author compiled and analyzed the records of four hundred men famous in all lines of intellectual activity in order to find when these persons accomplished the greatest work of their lives. While in the earlier years of life the emotional element is at its highest, and constructive work comes largely from this side of man's nature, as in artists and musicians, the higher mental qualities mature later, and are exhibited by scientists, philosophers, and statesmen. He makes a most remarkable showing of many cases — ninety in all — where persons even accomplished their greatest work at an advanced

age. This list deserves to be reproduced in any study of age. In the whole four hundred records the average duration of mental activity was forty years. While the ninety great men had been fruitful producers all through their lives, their masterpiece was reserved until toward the end. A few of these are so remarkable as to be pertinent here.

MAGNUM OPUS

Galileo, "Dialoghi delle nuove Scienze," at 72
Bancroft, "History of the United States," at 85
Buffon, "Natural History," at 81
Lamarck, "Natural History of Invertebrate Animals," at 78
Herbert Spencer, "Synthetic Philosophy," at 76
Goethe, "Faust" (second part), at 80
Tintoretto, "Paradise," at 70
Verdi, "Falstaff," at 80.

Moltke planned the successful campaign of the Franco-Prussian War at the age of seventy. It is a remarkable fact that many of the most successful generals in the great European War are comparatively old men. The broad grasp of events, the concentration, and quick decisions required in leading a military campaign, certainly depend upon the highest powers of body

and mind. If such great abilities can be exercised in the destructive agencies of war, what a wide field must lie open to those who are advancing in years in the constructive activities of the world in times of peace!

Let us give up the idea that there is a dead-line at fifty, sixty, seventy, or even eighty as far as intellectual possibilities and usefulness are concerned. This is an entirely individual matter. Some cross the dead-line at thirty, others at forty, others at fifty, and others at eighty; some are even born on the wrong side of this line and never show any particular signs of mental or vital activity.

By conserving the later and riper years of life we will do much for civilization. The closing years should be made the happiest of life, and a right amount of health, with quiet contentment, will redound to the well-being of both the individual man and society. The thoughtful cultivation of a fair degree of health and a good deal of optimism is needed to round out the later years of life in an altogether satisfactory and hopeful way.

Robert Browning caught and expressed the ideal of optimism for the aging:

Grow old along with me!
The best is yet to be,
The last of life, for which the first was made;
Our times are in his hand
Who saith, "A whole I planned,"
Youth shows but half; trust God; see all, nor be
afraid!

CHAPTER VIII

HEALTH AND NUTRITION: THE FOOD QUESTION

GOOD health and vigor depend in a very large degree upon proper nutrition. This, in turn, is conditioned by digestion, assimilation, and a right selection of food. It is not what we take, but what we are able to assimilate thoroughly, that really nourishes the body.

There are several preliminary questions concerning nutrition that may be considered before taking up different kinds of food.

WHEN AND HOW TO EAT

When and how we eat is often as important to good nutrition as what we eat. It is not only important to consider the quantity and quality of food, but how to eat it. Do not sit down to the table when nervously fatigued. A few minutes' rest before and after a meal will often be of the greatest aid to a weak digestion. By eat-

ing slowly and chewing properly, we not only favor digestion, but avoid the danger of taking too much food.

The mouth now assumes great importance in the economy of digestion and assimilation. If the process is started aright in this cavity, all the other organs and secretions act to better advantage. By first splitting up the food into small particles, the various digestive secretions are able to come into close and effective contact with all the ingested food.

It is also a peculiarity of digestion that each secretion has a stimulating effect upon all the other secretions that come into action later in the digestive process. When appetizing food is smelled, the mouth is said to water. This actually does take place by the saliva being poured forth in anticipation of a tempting morsel through the stimulation of the olfactory nerves. It follows therefore that tasty and inviting food digests easier than that which is unattractive. The mouth starts the process right by an abundant secretion of saliva, which, in turn, stimulates the gastric juice, bile, pancreatic and intestinal juices. The whole round of digestion is thus satisfactorily carried out, first, by a careful

selection and preparation of food, and, secondly, by properly eating it.

It is often a mistake to try to diet too rigidly on the theory that certain foods will not agree in various conditions. As a general rule, the food that most tempts the appetite will be digested and assimilated most easily. Good results often follow the most diverse methods of curative diet, and this is explained more by the regulation of the food in amount, time of consumption, and method of administration, than in the specific articles allowed or forbidden.

LOSS OF APPETITE

When there is loss of appetite and disinclination to eat, it is a mistake to try to force food upon a reluctant stomach. This is sure to be followed by indigestion and malassimilation. It is simply filling up the system with nutriment that, by not being absorbed, acts as a foreign body. In many sicknesses, harm is done by anxious friends insisting upon administering nourishment that is repellent to the patient, and which is sometimes given so often that neither the stomach nor the individual can get a much-needed rest.

When the appetite lags, the trouble begins in the mouth, as sufficient saliva is not secreted. As previously noted, when this occurs, the gastric juice, bile, and other secretions will later become sluggish, and the body cannot take proper care of nutriment that has been forced in the absence of any craving on the part of nature. It likewise happens that undigested food in the stomach is sure to ferment, as warmth, moisture, and stasis all favor this process. When the appetite is lost, it is better to give the stomach a complete or partial rest, in the meantime trying to find and correct the cause of the disinclination to eat.

FOOD AS FUEL

The human body, like the automobile, is run as an internal combustion engine. While the latter is fed with gasolene, and the electric spark starts a marvelously quick combustion, in our bodies the food is the fuel which undergoes very slow combustion. Thus the gasolene motor is a quick-burning, high-temperature machine, while the human motor is a slow-burning, low-temperature machine.

In a previous chapter we likened the human body to a machine in which all the parts required

watching, in order that they may be kept in the best possible working order. To keep it in good operation, every machine needs fuel of some kind. This fuel, by its combustion, generates the energy that makes the machine go. If the fuel is piled in to excess, the fire is smothered. If poor or improper fuel is used, the grate gets clogged, and the fire does not burn well.

It is the same with the human machine. Food is the fuel and, if it is poor, or used too lavishly, it fails to get the best work out of the body. While this analogy is true as far as it goes, we must also recognize the fact that food of a certain kind has, besides the power of combustion, the ability to build or repair tissues.

The great variety of articles used for food can be reduced to a few substances that are necessary to life. These are known as proteins, mineral matter, fats, carbohydrates, and water, the latter forming an essential ingredient of all foods. All these food principles are found in a variety of forms. Protein exists as lean meat, the curd of milk, fish, poultry, eggs, a certain part of cheese, beans, barley, oatmeal, and the gluten of flour. The mineral matter consists largely of earthy salts, such as phosphate of lime

and compounds of magnesium, sodium, potassium, and iron. These substances are usually taken into the body in combination with the proteins. The fats are seen incorporated with meats, or as lard, butter, the cream of milk, and vegetable oils. The carbohydrates are the various starches and sugars that are combined in cereals, potatoes, flour, and vegetables. The human body itself is likewise composed of these basic principles in the following proportions: proteins, eighteen per cent.; mineral matter, six per cent.; fats, fifteen per cent.; carbohydrates one per cent.; water, sixty per cent. We here see what a liberal proportion of the body consists of water. It forms a large bulk of all the tissues, besides acting as the universal solvent.

FUNCTIONS OF DIFFERENT FOODS

When we take various substances into the body as food, they have different functions to perform. The proteins minister to the growth and repair of the body; the fats supply heat and energy and may be deposited as fats in the tissues; and the carbohydrates also supply heat and energy, and may be changed into fat in the system.

It is wise and economical to employ these food principles in the proper proportion to serve the function for which they were intended. While it is possible to employ protein to supply heat and energy, if enough carbohydrates or fats are not given, this is not good practice. Not only are protein foods usually much more expensive to purchase, but they leave a greater residue of waste material in the body, and this ash must be excreted by the kidneys in the form of urea and uric acid. A predisposition to many diseases is caused by the retention of these waste products in the body.

The fats and carbohydrates are usually burned and turned into gas, which is passed out by the lungs in an unirritating form as carbon dioxid. Although fats and carbohydrates to a certain extent may serve the same purpose and may often be used interchangeably, they can never take the place of protein. A sufficient amount of the latter must always be furnished.

As the human body must be built from food, the character of the body will be largely determined by the materials from which it is constructed. Each ingredient of food, namely, pro-

teins, fats, carbohydrates, mineral matter, and water, has, as already noted, a definite function to perform, the proteins and mineral matter forming the tissues and bones, and the fats and carbohydrates giving the supply of energy that runs the human machine. It is, therefore, of vital importance to see that the food contains these materials and to know what quantities are present. We must look to the chemist for this knowledge.

There has been some difference of opinion as to the amount of protein the body requires for daily building and repair. In Europe, Voit considers that a man of one hundred and sixty pounds, doing a moderate amount of physical work, needs at least one hundred and twenty grams of protein daily. In this country, Atwater considers that a man at hard labor calls for one hundred and fifty grams of protein daily, and Chittenden states that for a man of one hundred and fifty-four pounds there is required only sixty grams of protein daily. This would represent approximately four ounces, five ounces, and two ounces avoirdupois. As Chittenden's requirements are only about half those of the other

authorities, they have not as yet been generally accepted. Any theory on matters such as foods and feeding must eventually stand or fall by the results of practice.

GROUPING OF FOODS

A convenient grouping of foods has been furnished by one of the bulletins of the United States Department of Agriculture — No. 712 — as follows:

Group 1. The protein-rich foods.—Milk, cheese, meats—except the very fattest, fish, poultry, dried beans, peas, and cow peas, peanuts; most other nuts are likewise rich in protein.

Group 2. The cereal or starchy foods.—Breads, cereal mushes, ready-to-eat cereal breakfast foods, rice, macaroni, tapioca.

Group 3. The fatty foods.—Butter, cream, salad oils, bacon.

Group 4. Vegetables and fruits.—Here some confusion may arise because the term vegetable is sometimes used to mean all foods of plant origin, and in this sense would include cereals, dried beans, and other foods which have been classified above. As here used, it applies only to those which are used as side dishes with meat, or as salads, and in similar ways: Potatoes, greens, lettuce, celery, green peas and beans, carrots, asparagus. Under this heading

come also all cooked or raw fruits, with the exception of those that are preserved, and dried fruits in which the percentage of sugar is high because most of the water has been driven off.

Group 5. Simple sweets.—Cakes and cookies which contain little fat, cane sugar, plain candies, maple sugar, sweet chocolate, jellies, preserved fruits, jams, marmalades, honey, molasses and other syrups, dried figs, dates, raisins and other dried fruits, and similar foods are members of this group.

If, as a general rule, each of the above groups is represented, the diet is likely to maintain all the important nutrients — protein, fat, starch, sugar, mineral matters, and growth-stimulating substances.

BALANCED DIETS

As a properly balanced diet calls for a combination of the different food principles in order that they may supplement one another, foods must be chosen in such a way as to give the needed balance. As an example, bread is high in carbohydrates, moderate in protein, and deficient in fat; therefore butter must be added in order to furnish a properly balanced diet. In like manner we may combine potatoes and cream and fruits with nuts. While these and similar

combinations respond to the sense of taste and are thus often used instinctively, they have a true physiological reason back of them.

In the same way, certain fruits and vegetables, while not containing much actual nutriment, possess elements that are necessary to maintain the chemical equilibrium of the body. Various fruit and vegetable acids and some of the inorganic salts, especially those containing phosphorous, lime, and iron, may be mentioned in this connection. Most fruit acids also have a beneficial effect in cleansing the mouth and thus helping to preserve the teeth. A mixed diet, including fruits and vegetables, will usually furnish the necessary amount of these substances.

Animal and vegetable foods differ somewhat as to their digestibility. As the meats derived from animals resemble the muscles of our own bodies, they do not require much change before they are assimilated. Vegetable compounds are more difficult of digestion, on account of the nutrient portions being surrounded by a woody tissue called cellulose, which resists the action of the digestive juices. Prolonged boiling or cooking ruptures this and enables the digestive fluids to act to better advantage. A collateral use of

this woody fiber is that it furnishes a ballast to the bowels that favors regular evacuation. Bulky, uncooked foods are often beneficial in this way.

VITAMINES

It has been found that the real nutritive values of foods depend not only on the essential food principles, proteins, carbohydrates and fats, and the caloric value of the foods, but upon other essential substances that are necessary to health. These are living entities that have been called vitamines; although these substances may be present in only very minute traces, they are necessary factors in nutrition if health is to be preserved. The vitamines are especially present in all the grains, such as barley, wheat, oats and rye, and also in eggs, fresh milk, meats, and yeast extracts. No diet can be long continued that does not contain one or more of the foods containing vitamines. It is doubtless due to this fact that the prolonged absence of fresh fruits and vegetables in the diet is followed by profound nutritional disorders, of which the disease known as scurvy is the commonest.

FOOD VALUES IN TERMS OF CALORIES

The question of calories is well explained in one of the bulletins of the United States Department of Agriculture, No. 34, where it is stated that during digestion, assimilation, and utilization, food in the body undergoes great chemical changes, by many of which heat is liberated. It is through such chemical processes that the energy required for internal and external muscular work is provided and the body temperature maintained.

Energy may be conveniently measured in terms of heat, the calorie, or heat unit, being used for this purpose. A calorie is the quantity of heat required to raise the temperature of one liter of water one degree centigrade, or very nearly the amount of heat required to raise the temperature of one pound of water from 0° to 4° F. In order to find the energy value of any food, a given quantity is burned in an apparatus surrounded by water, and the energy value in calories is determined by the number of liters of water that will be raised in temperature 1° centigrade.

It has been found by experiment that when one ounce of either protein or carbohydrate is

burned, sufficient heat will be given off to raise the temperature of 120 liters of water 1° centigrade, and one ounce of fat, when burned, will raise 280 liters of water 1° centigrade. Hence, the first two substances are said to yield 120 calories, and the last 280 calories per ounce. We can now understand that while all nutrients are possible sources of energy, the body should depend upon fats and carbohydrates as energy-producing foods, rather than upon protein, which has tissue-building functions not possessed by the other nutrients. Moreover, fats are more efficient as sources of energy than either protein or carbohydrates. It has been estimated that one pound of digestible fat yields 4260 calories of heat or energy, while one pound of protein yields 2000, and the same amount of carbohydrates, 1860 calories, the fat thus giving over twice the number of calories that the other food principles are capable of yielding. This accounts for the fact that fatty articles are consumed in greater amounts in cold weather and in frigid climates. It has been estimated that for every 100 calories, about 10 per cent. should be produced from proteins, 30 per cent. from fats, and 60 per cent. from carbohydrates.

Foods yielding about 2500 calories a day are required by the average person in sedentary pursuits. The following table, arranged by Dr. R. H. Rose, will show a sample maintenance diet giving the required number of calories:

Sample Maintenance Diet for a Person Weighing 150 Pounds in Light Exercise

Breakfast

	Grams of Proteins	Calories
Orange	1	70
Cereal	3	110
Roll	3.5	115
Coffee [1]	1	60
Cream, two tablespoonfuls	1	100
Sugar, three tablespoonfuls	..	80
Butter, one ball	..	30
		535

Lunch

Eggs, two	13	160
Slices of bread, two	4.6	140
Butter, one ball	..	80
Sugar, two teaspoonfuls	..	66
Rice pudding	4	160
	30.1	606

[1] Coffee has no protein or caloric value, which shifts other figures lower, as indicated.

Dinner

	Grams of Proteins	Calories
150 gms. roast beef, 5x3x¾ inch....	34.5	450
Potatoes, medium size	2	90
Bread, two slices, 4x4x½ inch	2.6	140..
Soup, thickened, 250 gms.	5.5	160
Squash, two tablespoonfuls	0.5	80
Peas, two tablespoonfuls	5	160
Cream	2	60
Sugar	..	166
Apples, baked	.5	75
	51.6	1,421
Total, three meals	81.7	2,562

THE NUTRITIONAL VALUES OF COMMON FOODS

The following table has been arranged from various sources to show the nutritional value, together with a possible yield in calories, of common articles of diet. The reader can thus estimate the nutritional, as well as the heat and energy value, of every-day foods:

Approximate Composition and Caloric Value

FOODS DERIVED FROM ANIMAL SOURCES

Meats and Fish.	Composition Protein Per Cent.	Fat Per Cent.	Carbohydrates Per Cent.	1 ounce avoir. yields Grams of Protein	Calories
Lean pound of beef	22.6	2.8	0	6.4	34
Lean pound of beef (cooked)	27.6	7.7	0	7.8	52
Lean leg of mutton	19.8	12.4	0	5.6	55
Lean leg of mutton (cooked)	25.0	22.6	0	7.0	90
Chicken (broilers)	21.5	2.5	0	6.0	32
Chicken (fowls)	19.3	16.3	0	5.5	65
Bacon	10.5	64.8	0	2.9	183
Fish (mackerel)	18.7	7.1	0	5.3	40
Soups					
Beef	4.4	0.4	1.1	1.2	8
Chicken	3.6	0.1	1.5	1.0	6
Meat stew	4.6	4.3	5.5	1.3	23
Milk and its derivatives					
Cow's milk (poor)	3.0	3.0	5.0	0.85	18
Cow's milk (good)	3.2	4.0	5.0	0.90	21
Cow's milk (rich Jersey)	3.5	5.5	5.0	1.00	25
Cream	2.5	40.0 to 16.0	4.0	0.70	119
Skimmed milk	3.4	0.3	5.0	0.96	11
Buttermilk	3.0	0.5	4.8	0.85	10
Condensed milk (sweetened)	8.8	8.3	54.1	2.50	95
Evaporated milk	9.6	9.3	11.2	2.70	49
Butter	1.0	85.0	0.0	0.28	225
Eggs					
Hen's eggs (boiled)	13.0	12.0	0.0	3.6	48

FOODS DERIVED FROM VEGETABLE SOURCES

Cereal Products					
Rolled oats	16.0	7.3	67.0	4.5	115
Cracked wheat	11.0	1.7	75.5	3.1	105

	Composition Protein Per Cent.	Fat Per Cent.	Carbohydrates Per Cent.	1 ounce avoir. yields Grams of Protein	Calories
Farina	11.0	1.4	76.3	3.1	105
Hominy	8.3	0.6	79.0	2.3	103
Flaked rice	7.9	0.4	82.0	2.2	105
Bread and Crackers					
Brown bread	5.4	1.8	47.1	1.5	65
Whole wheat bread	9.7	0.9	49.7	2.7	71
White wheat bread	9.1	1.6	53.3	2.5	76
Toasted wheat bread	11.5	1.6	61.2	3.2	88
Butter crackers	9.6	10.1	71.6	2.7	121
Saltine crackers	10.6	12 7	68.5	2.9	125
Soda crackers	9.8	9.1	73.1	2.7	120
Starch and Sugars					
Cornstarch	0.0	0.0	90.0	0.0	105
Arrowroot starch	0.0	0.0	97.5	0.0	113
Granulated sugar	0.0	0.0	100.0	0.0	116
Milk sugar	0.0	0.0	100.0	0.0	116
Vegetables					
Beans, string (cooked)	0.8	1.1	1.9	.22	6
Beans, baked (cooked)	6.9	2.5	19.6	1.90	37
Peas, green (cooked)	6.7	3.4	14.6	1.90	34
Potatoes, boiled	2.5	0.1	20.9	.70	28
Potatoes, mashed and creamed	2.6	3.0	17.8	.71	31
Potatoes, sweet (cooked)	3.0	2.1	42.1	.85	58
Spinach (cooked)	2.1	4.1	2.6	.59	16

ECONOMY IN FOODS

The question of expense is an important one in considering healthful nutrition, especially at the present time. The increasing cost of food of

all kinds makes this problem very urgent to those having small incomes.

The first necessity is to eliminate waste as much as possible. There must be more care in the practice of household economies. The secretary of agriculture in discussing the food situation recently, stated that more than seven hundred million dollars worth of edibles was wasted in our kitchens annually.

It has been aptly stated that the high cost of living is due partly to the cost of high living. All sorts of waste can be included in the latter. The housewife also needs instruction in the relative value and cost of food. The most expensive foods are not necessarily the most nourishing or desirable. Among the meats, prolonged and proper cooking will enable the cheaper and coarser cuts to serve all necessary purposes. American cheese, dried peas, and beans are high protein foods that can take the place of meat. Rice and corn-meal mush make good substitutes when potatoes are scarce or high: besides being cheaper, they are likewise more nutritious. Oleomargerine and cotton-seed oil are wholesome and cheap substitutes for butter. Ordinary cereals, such as oatmeal, hominy and corn-meal,

are as good as patent cereals and much cheaper. A glance at the table of food values on a previous page will enable one to be sure of the desirability of any selected foods.

EXPERIMENTS IN ECONOMY

The Life Extension Institute of New York recently made an interesting experiment in which twelve policemen were fed for three weeks at an expense of twenty-five cents a day for each individual. The cost of the food was based on prices prevailing in January, 1917. The menus for one week were as follows:

Sunday. Breakfast—Oatmeal and milk, corn griddle cakes, syrup and butter, coffee; cost five cents.

Dinner—Rolled steak, graham bread and butter, mashed sweet potatoes, chocolate ice cream, cheese, tea; cost eleven cents.

Supper—Creamed oysters on toast, Parker House Rolls, stewed peaches and raisins, butter, cheese, tea; cost nine cents.

Total value 3160 calories.

Monday. Breakfast—Hominy and milk, graham toast and butter, coffee; cost seven cents.

Luncheon—Scalloped rice and tomatoes, corn muffins and butter, apple dumplings and hard sauce, tea; cost seven cents.

Dinner—Hamburger steak, Lyonnaise potatoes,

whole wheat bread, cottage pudding with clear sauce, tea; cost eleven cents.

Total value 3370 calories.

Tuesday. Breakfast—Oatmeal and milk, crullers, rolls and butter, coffee; cost seven cents.

Luncheon—Potato soup with carrots, rye bread and butter, stewed prunes and ginger snaps, tea; cost eight cents.

Dinner—Parsnips, baked with sausage, samp, whole wheat bread with butter, bread pudding with fruit sauce, tea; cost ten cents.

Total value 3005 calories.

Wednesday. Breakfast—Hominy and milk, toast with butter, coffee; cost seven cents.

Luncheon—Baked lima beans, Boston brown bread and butter, sliced oranges and bananas with shredded cocoanut, tea; cost eight cents.

Dinner—Liver and bacon, creamed potatoes, whole wheat bread and butter, coffee jelly, tea; cost ten cents.

Total value 3035 calories.

Thursday. Breakfast—Oatmeal and milk, buttered toast, coffee; cost seven cents.

Luncheon—Macaroni croquettes with tomato sauce, graham bread and butter, corn starch pudding with raisin sauce, tea; cost eight cents.

Dinner—Beef pot roast, carrots and onions, whole wheat bread and butter, caramel tapioca, tea; cost ten cents.

Total value 3030 calories.

Friday. Breakfast—Hominy and milk, buttered toast, coffee; cost seven cents.

Luncheon—Baked rice and cheese, raisin bread, apple sauce, tea; cost seven cents.

Dinner—Escalloped salmon, German fried potatoes, graham bread and butter, prune pie, tea; cost eleven cents.

Total value 3070 calories.

Saturday. Breakfast—Oatmeal and milk, rolls and butter, coffee; cost seven cents.

Luncheon—Fried mush and syrup, white bread and butter, stewed apricots, tea; cost seven cents.

Dinner—Baked beans with salt pork, whole wheat bread and butter, molasses cake, tea; cost eleven cents.

Total value 3120 calories.

Of course this experiment was conducted by experts and skilful shoppers, but still it shows what can be accomplished by a careful study along this line. Most of the men gained in weight during the three weeks of the experiment.

About the same time the social service department of one of the New York hospitals arranged a dietary plan by which two adults and three children could be fed and maintained in good health at a weekly cost of seven dollars and thirty-one cents.

While prices vary somewhat with seasons and

the conditions of supply and demand, the general increase in the cost of living makes it very necessary to study the relation of the cost of food in connection with its nutritional value.

It is finally important to note that some people have idiosyncrasies in reference to certain articles of diet. Violent disturbances may follow taking the smallest amount of such foods. This phenomenon is sometimes known as allergy. Shell-fish, strawberries, and other innocuous foods have been known to cover the skin with profuse rashes, to cause bowel upsets and difficult breathing. As a rule, these disturbances pass off in a few hours, but occasionally they are dangerous. It is desirable that these food idiosyncrasies be early recognized so that the diet may be arranged accordingly. Not only temporary, but more permanent trouble may thus be avoided. The various forms of food shock are more apt to be seen in early years while tolerances are being established.

Epicurus well sums up the question of food:

"To habituate self, therefore, to plain and inexpensive diet gives all that is necessary for health, and enables a man to meet the necessary requirements of life without shrinking."

CHAPTER IX

HEALTH AND DISEASE: AVOIDING INFECTION

IN a previous chapter attention has been called to the fact that a long and efficient life depends largely upon freedom from illness. All severe sicknesses and even some mild attacks, are apt to leave a change in the bodily machine that may eventually interfere with its proper and prolonged operation. It is, therefore, the part of wisdom to learn how to avoid illness. The parents should begin early in life instructing children so that they can later look out for themselves. Few of us realize how much can be done along this line. Many evils of life are clearly preventable, and this particularly applies to not a few of the common diseases.

PREVENTION OF DISEASE

The great achievements of modern preventive medicine are having far-reaching effects. It is only necessary to speak of a few of these triumphs

in order that the overwhelming debt of humanity to modern medicine may be appreciated.

To-day the plague is unknown except among the ignorant, superstitious people of India, who refuse proper measures of relief; yet in the fourteenth century twenty-five millions in Europe died the horrible death of this disease. In civilized countries vaccination has virtually eliminated smallpox. During the eighteenth century in Europe, sixty millions died from this loathsome infection and multitudes who did not die were permanently scarred and mutilated. The reign of destruction and death accompanying this disease continued until Jenner's great discovery in 1796.

Sanitary improvements have reduced the death-rate in large cities all over the world; and a lower death-rate means a much lower percentage of sickness. No one can estimate the amount of suffering, as well as the economic loss to society, thus avoided.

Coming to very recent years, treatment by antitoxin of that scourge of childhood, diphtheria, has in many localities reduced the mortality by more than thirty per cent, and, in the fatal

and agonizing croup variety, by nearly fifty per cent.

The germ of malarial diseases has been discovered, as well as the kind of mosquito that spreads the poison. By draining swampy areas and by taking measures for the destruction of the mosquito, large tracts of hitherto waste land are rendered safe and productive, and a widespread cause of debilitating sickness, and even of death, is removed.

It is known that only one variety of mosquito (*Anopheles*) can spread malaria by its sting, and then only after having previously bitten a person already infected. Large marshes, where fresh-water streams empty into salt water, although breeding numberless mosquitoes, rarely produce the kind that spreads disease. The germ-carriers are usually fresh-water mosquitoes. The latter may breed in any small pool of water, even such as may be found in a tin can or a gutter. The smallest collection of water must be completely drained away; and if marshes or moist areas cannot be so treated, the water may be sprinkled with kerosene oil, one ounce to fifteen square feet of surface. In this way, a

locality can be freed from these pests, which are always annoying and sometimes very dangerous. As the disease-carrying mosquitoes are only active at night, they must be kept out of houses and sleeping-rooms by screening windows and doors with a fine netting.

Unless caught by a high wind, mosquitoes rarely travel more than a few hundred yards from their breeding-spots. A person suffering from an acute malarial attack must be carefully protected from them, as, if the disease-carrying kind bites such a patient, the malady may be spread to others in the community. Thorough screening and a free use of quinine will soon bring a possibly dangerous patient to a state not so threatening to others.

Another variety of mosquito (*Stegomia*) spreads yellow fever in the same way. By exterminating this variety, yellow fever has virtually been banished from Cuba, although it followed its destructive course there for nearly two centuries.

The known agency of rats, flies, and various insects in the spread of disease germs has enabled the physician to control cholera, the plague, and similar diseases. It is now recognized that

the common house-fly takes an active part in the spread of disease; the germs stick to their bodies and are so carried from one person to another. Dysentery, typhoid fever, and bowel disorders are known to be spread in this way, and it is highly probable that scarlet fever, diphtheria, smallpox, cerebrospinal meningitis, tuberculosis, infectious eye disorders, and possibly infantile paralysis, may likewise be disseminated by the fly. It is believed that infected flies can be dangerous for a long time after they have become contaminated.

Good health, therefore, requires the destruction of the fly. It has been estimated that a female fly lays an average of one hundred and twenty eggs at a time. These eggs are deposited in filth of some kind, where maggots are first developed, and finally the full-grown fly.

The popular slogan, "Swat that fly," is not so far-reaching as supposed. It deals with effects rather than causes. It would be wiser and much more effective to direct any "swatting" toward the dirt-heap that produces the fly. Manure piles are favorite breeding-spots. They should not be exposed, but always kept under cover, and in dark, protected places, as the fly does not breed

in darkness. In this respect it would help the farmer to give a coat of black paint to the inside of the manure bin. Flies are usually plentiful where horses are kept.

While flies, like mosquitoes, do not usually stray more than several hundred yards from their breeding-places, they may be carried anywhere by vehicles or horses and thus spread infection through a wide area. The menace of the fly to health can only be obviated by a thorough cleaning of town and house. Where the fly is found, we may be sure there is, in the near vicinity, some dirt or filth that offers the opportunity for breeding.

Municipal hygiene is most important in the preservation of health. The value of a good water-supply and proper drainage is shown by the stamping out of typhoid fever and similar diseases where these sanitary agencies are suitably employed.

VARIETIES OF DISEASE

Two general classes of disease may be considered in reference to the maintenance of health: first, those due, at bottom, to disturbances of digestion, with faulty metabolism and the vari-

ous degenerative processes that come with advance in life; and secondly, those due to infection by disease-producing germs. The former have been considered in previous chapters, especially those dealing with middle age and old age.

GERM DISEASES

Many diseases are produced by very minute microbes; they are usually of low vegetable origin and are classed as bacteria. These germs, when introduced into the body, grow with great rapidity, and in this process various toxins are elaborated that cause the symptoms of disease. Some of these toxins or poisons are more virulent than others. Nature tries first to destroy the bacteria by means of the living body cells, especially the white blood-corpuscles, and next to overcome the action of the toxins by developing antitoxins.

In order to avoid this class of diseases, every one should try, by cultivating good health, to keep the resistance of the body at its highest point. Healthy tissues are not easily infected. If, however, they should be, the defensive mechanism of the body will act to best advantage in those who are in good condition. The soil is

often as important as the seed when we consider the reaction of the body to various disease germs. It is the resistance of healthy body cells that prevents the growth of bacteria and of minute animal parasites that are everywhere present. It may be added, however, that comparatively few of the numberless microbes that abound in nature are capable of producing disease in the human body. Indeed most of the beneficent processes of nature are carried out through the agency of various micro-organisms. There are fortunately more good microbes than bad ones.

HOW INFECTION SPREADS

The common way in which germ diseases are spread is by direct contact between the sick and the well. These communicable diseases, as they are called, may be passed on, not only by direct contact, but by indirect methods as well. The first way is by touch, or by coughing, by sneezing and even by talking. By these means a fine spray, consisting of very minute droplets, is thrown out from the mouth or nose and the person within reach may be infected. By the indirect method, the germs in the various secretions

or excretions of the body, may become attached to various utensils, such as cups or forks or towels or handkerchiefs. They may also be present in dried sputum, in dust, and in food or water.

Communicable diseases may be grouped into two classes in reference to the method of disseminating their poisons. The first group includes smallpox, chicken-pox, scarlet fever, measles, whooping cough, diphtheria, septic sore throat, mumps, epidemic cerebrospinal meningitis, tuberculosis, and infantile paralysis, in which the infectious agent is generally limited to the discharges from the nose, throat, eyes, ears, and suppurating glands. The second group includes typhoid fever, para-typhoid fever, dysentery and Asiatic cholera, in which the infective material is found chiefly in the bowel and urinary discharges. Infantile paralysis and tuberculosis may, however, be included in either group.

It was formerly believed by scientists, and is still popularly thought, that germs of disease are floating in the air of the room occupied by the infected person. These microbes were supposed to attach themselves to objects on the wall, such as picture-frames or moldings, where they

were apt to drop on and infect any one who might come into the room. There is no scientific proof that this ever happens, and the theory of aërial transmission of disease is not now held by experts. While disease germs are thus not airborne, they may be at first carried in little droplets a short distance into the surrounding air, but probably not more than a few feet from the person coughing them out. Accordingly, fumigation of rooms after infectious diseases is being abandoned. A thorough cleaning and airing of the room is considered sufficient. Plenty of soap and water and soda has taken the place of irritant gases generated from sulphur or formaldehyde. The floors and woodwork may be scrubbed with a solution of one pound of washing soda and three gallons of hot water, as advised by the New York Board of Health. Washable clothing may be soaked in a five-per-cent. chlorinated lime solution, or in a five-per-cent. carbolic solution, and then boiled. Books and toys that have been constantly handled should be burned. Sunlight, when available, is the most effective disinfectant, as no germ can live when exposed to the sun's rays.

The most efficient control of infectious diseases

consists of a prompt destruction of all the body discharges as soon as passed. The nose and mouth secretions are the commonest sources of infection.

Outside the house, the collection of many people in closed spaces does much to spread infectious diseases. Crowded cars, where people are standing in close contact, moving-picture shows, schools, and similar places spread disease of all kinds. Coughing, sneezing, and even talking at close range will here spread infection. It has been proved that virulent bacteria are present in many closed and crowded spaces.

Indirect infection may be avoided by not using common drinking-cups, towels, or various dishes that have not been thoroughly cleaned. Dusty rooms should be cleaned by the use of moist cloths rather than by the familiar feather duster that may spread about any germ-laden dust. Most disease germs live only a short time after discharge from the body, but a few may survive by drying and so be carried in dust. The consumption germ and diphtheria and typhoid bacilli are examples of the latter. It used to be thought that sewer gas was active in the spread of infection, but this effluvium is now known to

be comparatively harmless and certainly incapable of spreading disease. The worst sewer built is usually better than no sewer, and workmen employed in sewers do not usually suffer in health.

There are two ways in which infections may be spread that are very hard to obviate. The first is by exceedingly mild and unrecognized cases of disease. Persons thus attacked mingle freely with others and disseminate the germs that, while having little effect upon them, may yet cause a severe or malignant attack in another. The second method of spreading germs is by what is known as "carriers." These people harbor active germs of disease in their bodies without being made ill by them. While immune themselves, they unfortunately give out the germs of disease to those who may be susceptible to attack. It is fortunately true, however, that it usually requires many germs to start an infection, and the cells and secretions of the body can be depended on to kill off a few of them.

Attention will now be directed to various common infections, as a little knowledge as to how they act and the principal sources of danger will

help in avoiding them. It has been estimated that seventy per cent of the deaths in the United States are caused by some sort of contagion. Therefore the question of avoidance is a vital one.

COMMON COLDS AND RESPIRATORY DISEASES

Few appreciate what damage can be done by ordinary colds. Most cases of bronchitis and many attacks of pneumonia have their origin in this way. An important point to consider is that one cold, unlike some affections, does not confer immunity, but rather predisposes to future attacks. A number of different germs may produce colds in the nose and throat, and comparatively mild germs may pave the way for the more dangerous types, such as the pneumococcus, or tubercle bacillus. This is what makes many ordinary colds serious. There is often a quick descent of an inflammation from the nose and throat through the bronchial tubes and finally to the cells of the lungs. As many people are constantly carrying the germs of respiratory diseases in their upper air-passages, particularly in winter, every effort must be made to prevent

their growth. This means keeping up the vitality by hygienic living. When the digestion is upset, one catches cold easily. A coated tongue and sluggish bowel predispose to all kinds of infection. A free action of the skin is also desirable.

The two reflexes that lead to quick congestion of the nose and throat start from the back of the neck and the feet. A chilling of these parts is always apt to induce a cold. When the neck is too warmly covered and shortly afterward exposed to a cold draught, with the skin relaxed or perspiring, the mucous membranes of the nose and throat will quickly respond by a reflex irritation. Little girls with heavy masses of hair covering the back of the neck often catch cold in the same way, but braiding the hair or holding it back from the neck will reduce this risk. It is well to try to toughen this susceptible region by sponging the neck and chest with cold water on rising.

The feet, when wet or chilled, also quickly congest the upper air passages. In snowy, wet weather many colds can be avoided by properly protecting the feet with rubbers or arctics. Children should never be allowed to sit in school

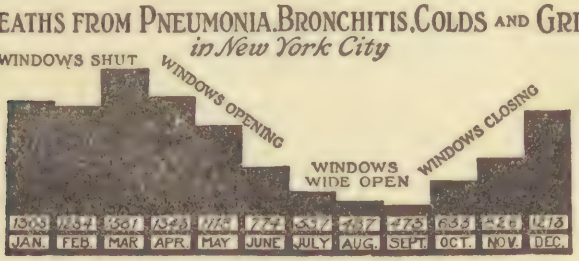
with cold, wet feet. They had better be sent home for a change rather than run the chance of illness. Cold feet at night also keep the throat irritated and should be avoided by booties or some similar protection.

We must remember that, whenever a mucous membrane is irritated or congested, it affords favorable soil for the growth of germs, either those already present or others received from some one else. This is one reason that adenoids at the back of the throat or enlarged, congested tonsils not only harbor germs, but favor their development.

As most of the secretions of the respiratory tract are infective during inflammation, the greatest care must be exercised, whether we are dealing with a simple nasal secretion or the sputum from a deep-seated affection of the lungs. It is a common experience to have colds and influenzas spread all through a household or a school. This is due to a constant spraying of the air with infective droplets from coughing or sneezing, and indirectly from mucus deposited on towels or handkerchiefs. Complete or partial isolation is desirable during the acute stage of any catarrhal affection, and all the secretions

should be kept from contact with articles that may be in common use. It has been found that droplets coughed out in influenza sometimes remain suspended in the air for several hours, capable of infecting others.

Good ventilation, with well-aired, sunny rooms, will do much to prevent the spread of infection. Clean, fresh air is very effective in dissipating poisons and preserving health. The New York Board of Health has recently demonstrated the effect of lack of good ventilation and fresh air upon the mortality curve in common respiratory diseases. This was done by the following vivid illustration:



Some care must be exercised, however, not to allow a direct draft on the body from wide-open windows, especially in sleeping-rooms. Undue exposure during cold, damp weather may be

harmful during sleep. Common-sense must be called into play in the distribution of fresh air. Dry, furnace-heated rooms, kept at too high a temperature, are always unfavorable.

During inclement weather, special efforts must be made to avoid the danger of contracting respiratory diseases. This means an avoidance of fatigue and excesses of all kinds both in eating and drinking. Sufficient sleep is a good preventive and many a severe cold or influenza would be cut short if a person could rest quietly in bed for twenty-four hours during the first onset of the attack.

Whooping-cough. This is a severe disease, which is especially dangerous to little babies. The cause has been found to consist of a specific germ that locates in the upper air tract and is thrown out with the spray that follows the cough. It is, therefore, during the paroxysms of coughing that the disease is commonly spread. Kissing may also be a means of infection. While others are usually infected by direct exposure, it is considered possible that the disease may occasionally be contracted by means of a third person or by various utensils that have received the spray from the cough. All specific infections

have what is known as a time of incubation, which includes the period from exposure until the disease becomes active. During this time, however, the disease is not contagious. The incubation of whooping-cough is from one to two weeks.

The disease is most contagious during the early paroxysmal stage. Two weeks after the first whoop the contagion rapidly diminishes. The paroxysmal stage usually lasts from four to six weeks.

Fresh air is the best diluent of the whooping-cough poison. Keep the windows open, but avoid a direct draft if possible. It is desirable frequently to change rooms that have been freely aired. Unless the weather is very stormy, keep the patient out-of-doors and in the sunlight as much as possible. This will be more effective in quieting the cough than medicines.

Tuberculosis. While tuberculosis, the great, white plague, is a disease of all ages, its ravages are peculiar and wide-spread at the beginning of life. This disease holds the awful record of one-seventh of all the deaths in the world. The germ that causes it has a long period of infectivity, while most other disease germs die soon

after being cast out of the body and thus have only a limited interval of infectivity. It has been estimated that one billion bacilli a day may be coughed up by a patient with active consumption of the lungs. It is these so-called open cases that are dangerous to others. The bacilli are given off in small droplets in coughing, sneezing, or even in the current of air that comes from the lips when the person is talking. If all the secretions from the cough are received in little boxes made for this purpose, or in cheese cloth that is afterwards burned, there will be no danger to others. In consumption hospitals, where these precautions are scrupulously enforced, the disease is not spread to the healthy attendants. Expectoration may also be made into receptacles containing water, as one of the dangers consists in the drying of infected sputum that has been carelessly dropped on floors or rugs. The dust in rooms inhabited by consumptives may in this way be a source of danger to others.

The tubercle bacilli may be swallowed as well as inhaled. This takes place largely through milk that has been infected by bovine germs. Children are more apt to be affected by the latter than grown-ups, but, as a rule, there is, at all

ages, greater danger from inhaling than from swallowing the germs. Care must always be exercised, however, in food supplies that can carry this disease. The knowledge of its possible spread by meat and milk has led to careful inspection of carcasses and an improvement and cleaning up of the milk supply in large areas of country.

There are certain peculiarities of the disease in early life, such as specially involve the lymph-glands, bones, and joints rather than the lungs, and these constitute "closed" cases that are not dangerous to others. It is now believed that most attacks of tuberculosis in adult life have started from some focus of infection that began in the child and remained latent. Repeated colds, some of the specific infections such as measles or whooping-cough, or a general lowering of the vitality, may cause these latent foci to become active. This emphasizes the importance of avoiding infection during the growing period, and later, the desirability of keeping one's health at the highest point. Some believe, however, that a slight infection during childhood may help protect the adult by early developing the immunizing powers. It is, however, always

desirable to depend on a good vitality to resist these and other harmful germs. A knowledge that this dreaded disease is usually preventable and often curable acts as a stimulus to renewed and successful efforts for its final elimination. The disease is now slowly diminishing all over the civilized world in response to careful hygiene, the fresh air treatment, forcing the nutrition of the individual, and the prompt destruction of the germs so constantly thrown off.

SPECIFIC INFECTIONS WITH AN ERUPTION

Certain specific diseases are accompanied by an eruption on the skin and are known as exanthemata. They form the most common communicable diseases and they could often be avoided if there were a more general knowledge of how they spread.

MEASLES. This is one of the most highly contagious diseases that is met with in ordinary life. The incubation period varies from eight to fourteen days. It begins like an ordinary cold and the distinctive rash does not come out until the fourth day. In these preliminary days, with running nose and remittent fever, the disease is highly contagious, and this accounts for its

rapid spread in schools, as it requires fairly close contact. Two-weeks' isolation is usually sufficient as the infection comes from secretions of the nose and throat which disappear by that time. In many cases it ceases to be infective five days after the appearance of the rash. If there is a running ear, however, it may carry the contagion longer. The virus when separated from the body does not generally live longer than twenty-four hours. Scaling skin is not infective. The late winter and early spring are the periods when the disease is most active.

German Measles. This is a mild, although highly contagious affection that is apt to be confused with regular measles or very light scarlet fever. It is, however, a distinct disease, different from both the latter. The incubation is from ten days to three weeks. The eruption lasts a few days and then fades, and the infection is spread by the secretions of the nose and mouth. Two weeks is a safe period of quarantine.

Scarlet Fever. Few diseases vary so in type, from very mild cases that are difficult to recognize, even by an expert, to severe or malignant attacks. The former variety is active in spreading the disease, and a very slight attack in one

person may produce a bad attack in another. It may be stated that in recent years most epidemics have not assumed a very severe type. The incubation varies from two to seven days. A scarlet rash appears in from twelve to forty-eight hours after the first invasion, which is particularly marked by sore throat and a high fever. Infection is carried by the secretions of the mouth, nose, and ears, and not by the skin. It was formerly supposed that the flakes from the peeling skin were highly infective. The skin, however, does not infect unless contaminated by mucous from the nose and throat.

Stories of particles of skin caught in a book that is opened years later, and of some one thus infected are not now believed. Toys and similar objects may, however, be contaminated by the secretions of the mouth and thus spread the disease. The period of quarantine is usually placed at six weeks, although most cases cease to be infective long before this time. Thirty days is sufficient in an average case. Even the mild cases should be kept in bed during three weeks for their own safety as well as that of others. Like measles, this disease is most prevalent in late winter and early spring.

SMALLPOX. This severe and loathsome disease has, as a result of general vaccination, virtually disappeared in advanced communities. In order that prevention and change in the severity of smallpox may be continued, vaccination must be repeated occasionally. When this simple operation is performed in infancy, the disease is prevented during the period of growth, or so altered as to be innocuous. In after life it had better be repeated every ten or twelve years to make sure of protection. The period of incubation is from twelve to twenty days, and the victim is usually ill four days before the eruption begins. The pustules on the skin generally dry by the third week. The contagion exists in the pustules and in the dried crusts on the skin, as well as in the secretions and excretions of the body. The poison may thus be transmitted by a third person or by contaminated objects.

CHICKEN-POX. This is a mild, but acutely contagious disease that sometimes may be confused with a very light attack of smallpox. The incubation period averages two to three weeks. The eruption appears within twenty-four hours after the beginning of the attack and consists of several crops of little papules and vesicles. The

contagion is located in the vesicles so that the quarantine must be continued until they dry and disappear. This will usually happen in about ten days.

SPECIFIC INFECTIONS WITHOUT AN ERUPTION

Some of the severe communicable diseases have no rash to distinctly mark them. They must be recognized in other ways.

DIPHTHERIA. In this disease a false membrane, caused by specific germs, appears in the nose or throat. Millions of these germs will be found growing in the throats of a patient. The incubation is from two to five days. It is a strange fact, recently discovered, that many people are immune to the diphtheritic germ. Recent studies show that fully seventy-five per cent. of adults and eighty per cent. of new-born infants are immune. From two to five years is the most susceptible period. The explanation of this immunity is that certain individuals can develop in their own bodies enough natural antitoxin to protect them from attack. As the germs may be present in their noses and throats, these people, if exposed, may become carriers, and

thus be a means of spreading the disease while they themselves are not ill. It has been found that nearly two per cent. of people are carriers.

Diphtheritic germs may also live for a time on books or toys that have been coughed upon or handled by the sick. If the hands of the patient are put in the mouth they quickly become infected. The disease can, in this way, be spread directly and indirectly. Everything touching the diphtheritic patient must be cleansed and disinfected. For those exposed, an immunizing dose of antitoxin will usually prevent the disease. Every patient is dangerous to others until a culture shows that there are no germs in the nose and throat. A large-sized dose of antitoxin, given at the beginning of an attack, will, in a majority of cases, produce a cure and also help to ward off some of the dangerous complications. Diseased tonsils, adenoids, and decayed teeth form a good soil in which diphtheritic germs may live and develop.

Infantile Paralysis. The subject of infantile paralysis is just now very much in the air, but, fortunately for the peace of mind of nervous parents, the germs of the disease are not in the air, even in localities where the affection is epi-

demic. The virus, in the absence of carriers, does not spread through the atmosphere and in that way pass from one victim to another. This is really a very old disease, which has only recently been thrust into wide-spread public attention.

There has never been a time when this affection has not, in a sporadic form, been present in almost every community. Although serious to the patient, these cases were never looked upon as a menace to the community. They were treated in the general wards of hospitals, and no effort was made to isolate the cases in the home. The disease did not appear to be communicated from one to another. In recent years, however, it has become epidemic and communicable, possibly from some change in the nature of the virus.

The first reported epidemic occurred in Stockholm, Sweden, in 1887, and since then many epidemics have broken out in various parts of the world. The disease now tends to assume the epidemic form. A more frequent occurrence of epidemics has been observed since 1905. This has been noted both in this country and in Europe. Since 1906 there has been an epidemic

of some sort every year in some part of the United States. In spreading, the disease follows the lines of travel, showing that the poison is disseminated by means of the activities of human beings. A peculiarity of the epidemics heretofore observed, especially in this country, is that they have always occurred during the hot months, usually from July to the end of September. The seasons of attack have generally been noted as being unusually dry.

The incubation is from five to ten days, with an average of seven days. The disease is infectious and communicable and is not always accompanied by paralysis, although this is usually the case. Abortive types with nothing but spinal and muscular pain are not infrequent. A very minute, filterable micro-organism is believed to be the cause. This germ is located in the nose and throat and is sometimes cast off by the bowels. The virus both enters and leaves the body by the mucous membrane of the upper respiratory tract. It is believed that the disease is spread, not only by direct contact, but by carriers who harbor the virus in the secretions of the nose and mouth, although themselves immune. The control of the disease, as attempted

by health authorities, calls for the following procedures:

1. That all recognized and suspected cases be promptly reported.

2. Isolation of patients in screened premises. The duration of infectivity being unknown, the period of isolation must necessarily be arbitrary. Six weeks has been recommended by the Conference of State and Territorial Health Officers with the Surgeon-General of the Public Health Service as sufficient, and this period has been generally accepted throughout the United States. More recently, a three weeks' quarantine has been considered sufficient.

3. Disinfection of all body discharges.

4. Restriction of the movements of intimate associates of the patient, so far as practicable. This should include at least exclusion of the children of the family from schools and other gatherings.

5. Protection of children so far as possible from contact with other children or with the general public during epidemics.

6. Observation of contacts for two weeks after the last exposure.

The New York Board of Health gives the following advice to prevent the spread of infection:

1. The children from an infected house should be allowed out of doors but should be kept by themselves and away from large groups of other children. In

one and two-family houses it is advisable not to allow the children from an infected family outside of the yard for several weeks after onset of the case.

2. During the continuance of an epidemic of poliomyelitis children should not be allowed to congregate in public places.

3. Fresh air outings or vacation camps are allowed, if kept under competent medical supervision, with an adequate physical examination of each child before enrollment and the exclusion of any child from an infected family.

4. Absolute cleanliness of all homes is essential; such cleanliness should include:

(a) screens in all windows;

(b) flies kept out of all rooms;

(c) thorough cleanliness of all floors, woodwork, bedding and clothing;

(d) avoidance of dust (all sweeping should be done after the floors have been sprinkled with sawdust, bits of newspaper or tea leaves, all thoroughly moistened);

(e) garbage cans kept covered and washed out in hot soapsuds after they have been emptied;

(f) no refuse, either of food or other waste, allowed to accumulate.

5. Personal habits of cleanliness are essential; the hands should be washed before each meal, after each visit to the toilet, and before going to bed. Children should be warned about putting the fingers into the mouth or nostrils.

6. When sneezing or coughing, a handkerchief should be held over the mouth. Kissing of children is also a dangerous practice and should be avoided.

Adults are not very susceptible to the disease, and many children are also immune. After a great epidemic, there is usually a lull in the manifestation of the disease, as, it is supposed, all the susceptible people have been attacked, and the immune naturally escape. It is like a fire that has burnt itself out. When a new collection of susceptible subjects comes upon the field, the epidemic is likely to break out afresh.

Bowel Infections. Disease-producing, intestinal germs are seldom air-borne and this class of diseases is thus not acquired by inhaling. The germs of cholera, dysentery, various diarrheas, typhoid fever, and paratyphoid may be spread by contaminated milk, water, or surface vegetables. As the virus exists in the discharges from the bowels and sometimes of the kidneys, their prompt disinfection as soon as passed by the sick, will prevent the spread of these diseases. The typhoid bacilli may remain active after drying.

A pure, well-regulated water-supply should be

insisted upon by all communities. An epidemic of typhoid fever in any place is a reflection either on the intelligence or the watchfulness of the citizens.

An efficient preventive now exists in typhoid vaccination. This consists in three injections of killed typhoid germs at ten-day intervals. This develops the immunizing substances in the human body so that they can overcome the typhoid virus even after it has been taken into the system. Its efficiency is indicated by the fact that typhoid fever has been largely eliminated in armies during the exposure and risks of actual warfare, although this disease killed many more than bullets in numerous campaigns before vaccination was made compulsory.

It has been ignorantly thought by some objectors that certain diseases may be produced in the body by the vaccines that are used against them, but such an accident is rendered impossible by the preliminary destruction of the living germs. A most hopeful outlook is now held as to our power of enforcing the resistance of the body to various microbes and utilizing the substances in their dead bodies to stimulate the production of antitoxins and other defensive agents, in this

way rendering innocuous the toxins produced by their life processes.

The struggle for existence frequently resolves itself into a prolonged contest between microbes and men. The modern science of bacteriology has done much to conserve health and life by studying the natural history and development of the microscopic plants and animals that act as parasites, and which could perhaps destroy all higher life if they were not held in abeyance.

Finally, the question of illness has not only a vital but a very important economic side. It has been estimated that $500,000,000 is the yearly wage loss due to sickness in the United States.

CHAPTER X

HEALTH IN DIFFERENT SEASONS: CLIMATIC INFLUENCES

EACH season of the year has its own peculiar charm and likewise its special dangers. We must recognize the latter if health is to remain intact during the changing seasons. What is the first requisite of health under such conditions? We must change our habits, like our clothes, with the season. Only in this way will special risks be avoided.

In winter the cold weather and harsh winds put a strain upon the breathing organs, and, as a result, bronchitis, pneumonia, and various throat troubles are extremely prevalent. In the changing periods of spring and autumn, certain conditions of earth and atmosphere, aided by various insects, favor the development of typhoid and malarial fevers. As soon as the hot weather of summer sets in, the digestive tract and a depressed nervous system bear the brunt of trouble.

The extremes of life — the very young and very old — are especially vulnerable to any depressing effects that may accompany the different seasons.

THE WINTER SEASON

It must be remembered that cold has a depressing as well as a stimulating effect, depending largely upon the age and physical condition of the individual person. January, February, and March show the highest mortality of the year, with the last-named month usually in the lead. It is particularly the old and feeble who succumb at this period. Extra care must, therefore, be given during these months to those whose vitality is low. It is always the extremes of temperature, either summer heat or winter cold, that lowers the resistance of the body. Winter seasons that are accompanied by cold rains and a heavy snowfall tend to increase sickness, and epidemics of grippe and pneumonia abound.

All people should avoid undue exposure, such as leaving off overcoats or heavy wraps in very cold weather and not protecting the feet. Proper underwear is very important in the effort to maintain the surface of the body at an even temperature. It may consist of wool and cotton,

linen mesh, or silk, according to the experience or occupation of the individual. It is a mistake to be too warmly clad in the house, and it is not wise to wear heavy sweaters while at work or exercise indoors. One easily becomes overheated in this way and is more apt to catch cold on going out.

The costumes of women and girls in winter is often especially faulty. With the back of the neck protected by heavy fur, and the front of the waist wide open so that the chest is exposed to cold winds, they finish by wearing thin, paper-soled shoes that leave the feet unprotected and chilly. It would be hard to improve on such a costume as far as danger of respiratory diseases is concerned.

The rooms of our houses are often overheated in winter. Whatever the temperature desired, it should be kept as constant as possible. Varying temperatures are hard to resist. An average day temperature from sixty-eight to seventy degrees Fahrenheit, with plenty of good ventilation, will afford the best results in health. Occasionally old or feeble people require more warmth, and seventy-two to seventy-four degrees may then do better, but there must always be

free admission of fresh air. Good ventilation may be hard to procure in very cold weather when doors and windows are kept tightly closed in order that the room may be warm.

Where a number of persons are confined in a closed, unventilated space, the vitality is depressed, appetite and digestion suffer, and a heavy, drowsy feeling is experienced. This was formerly supposed to be due to the extra amount of carbon dioxid gas that is constantly expelled from the lungs of every individual in the room. There is too little carbon dioxid, however, in such exhausted air to do much harm. The trouble is rather occasioned by the heat, moisture, and exhalations from the skin that are constantly given off from the body. It is the collection of these exhalations in stagnant air that causes harm. The skin becomes moist and clammy, the sweat glands do not functionate well, and the elimination of impurities is thus checked.

It is not the chemical ingredients of the air, such as diminished oxygen and increased carbon dioxid, that are injurious, but the warmth and water vapor that interferes with healthy activity of the skin. By letting in fresh air, with proper ventilation, the moist, stagnant, depressing air

is quickly renovated, and the accompanying disability disappears. Schools, churches, theaters, and all public places where people meet in confined areas should be carefully regulated in winter, so that a suitable supply of fresh air may be constantly supplied and foul exhalations promptly removed. This would have a very favorable effect upon health in this inclement season.

For people who suffer from chronic respiratory diseases, a change to a warmer climate in winter is desirable if finances permit. It is particularly in the latter months of winter, February and March, that these troubles are most apt to occur. If such a change is made, it is not wise to return until the weather is completely settled, as the cold and wet of early spring are very trying, and all the benefits of the stay in a warm climate may thus be lost.

THE HEATED TERM

While great heat may come in the latter part of June, the mean temperature in July is generally the highest in the year. The thermometer registers, on an average, from one to two degrees higher in this month than in August. The rea-

son for this is that during August the nights are not only a little longer, but are apt to be cooler. Although the days may be very hot, this has a slight effect in reducing the average mean temperature. The first half of September is often particularly hard to bear on account of the weariness produced by the many preceding weeks of continuous heat. When humidity is added to heat, as frequently occurs during August and September, the effects of the heat are much aggravated.

INFANT MORTALITY

As the infant suffers most from heat, a few hints as to proper care during the summer months will point the way to conserve health and lower mortality. The latter has already been accomplished in many of our cities by establishing infant welfare stations and pure milk depots and by keeping a close medical oversight over the little children. July is the hardest month for them, and the mortality then is from one third to one half higher than in August, which is the next most trying month. The slightly higher temperature of July, already noted, may partly account for this, but a further explanation

probably lies in the fact that the weaker infants succumb during the first half of the summer, while those surviving this period are stronger and better able to endure the later heat.

One of the worst effects of heat consists in the changes produced in milk, which is the principal food of the infant. In general, a bottle baby should have less bulk of food and a higher dilution of milk in very hot weather than that to which it is accustomed under more favorable conditions. If this simple precaution were taken, much digestive trouble would be avoided. The interval between feedings may also be prolonged if the digestion shows any signs of derangement, but pure water is to be given freely during these intervals. In very hot weather the milk should be boiled or pasteurized as soon as it is received, and then kept cool until used. It is often well to place the milk bottle, well stoppered, next to a cake of ice.

It may sometimes be necessary to stop milk entirely and to give such substitutes as cold whey and thin gruels made from barley or wheat flour. If cow's milk is withheld for several days, mutton broth, from which all the fat has been carefully skimmed, makes a good substitute.

Expressed beef juice, diluted three or four times with cool water, makes a stimulating and mildly nourishing drink. Cold weak tea is also occasionally beneficial.

HOT WEATHER HABITS

Attention has already been called to the fact that the very young and the very old are unusually susceptible to the depressing effects of heat, and that the treatment of both the extremes of life is a good deal the same. We must not overlook the fact, however, that all ages are likely to be affected, and should therefore know how to guard against the dangers of summer heat. The life of people in the tropics is regulated according to the conditions of the climate; as the summer climate of a temperate zone is often very like that of the tropics, we may with profit imitate the mode of life in the more southern countries.

Exercise. During a prolonged hot spell all undue activity should be abated, especially during the oppressive midday hours. In their vacations, many people of sedentary habits indulge in violent exercise, with a mistaken idea that their health is thereby benefited. This may re-

sult in lassitude and even in illness during hot weather when outings are generally taken. Unnecessary exposure to the rays of the hot sun should always be avoided, and, if necessary, protection by an umbrella or a light well-ventilated straw hat is helpful. The habit in some summer resorts of going around in the sun bare-headed is bad alike for the hair, the skin, and the health. The cooler hours of the morning and late afternoon should be reserved for any special activity. A midday siesta is often desirable on hot days.

Food and Drink. Eating and drinking must also be regulated according to the weather. Food of a somewhat different kind, and smaller in amount, is called for in hot, as distinguished from cool weather. Meat and heat-producing substances, such as animal fats, can be cut down to a low point; cereals, fresh vegetables, and fruits may form the main articles of food. For those who crave a heartier diet, fresh fish and eggs will come in well.

The mild, non-stimulating drinks are best for hot weather. It is well to utter a caution, however, against continually drinking large quantities of ice-water. When one is thirsty, a small

quantity of cool water held in the mouth for a few seconds and then swallowed, will assuage the thirst as well as much larger amounts that may distend or derange the stomach. A large bulk of icy water does not long satisfy the thirst and is apt to weaken the digestive power of the stomach already disturbed and depressed by the heat.

Fresh milk, buttermilk, grape juice, raspberry juice, lemonade, barley water, cold tea, and coffee, and the various charged waters are all refreshing in hot weather. It must always be remembered that milk has a nutritive value, and hence can take the place of food, and, therefore, puts some work on the digestive organs. Milk should always be sipped slowly to prevent a large, hard curd forming in the stomach. It is a mistake to hurriedly pour down a glass of milk at the end of a meal, and thus add a large jelly-like mass of curds that will interfere with beginning digestion. Skimmed milk is a good hot-weather drink, as the removal of the cream makes an easily digested fluid for a stomach that may be depressed by the heat. Alcoholic drinks had better be abandoned, but if any are taken, light beers and very mild, dry wines will be the best.

If the appetite is poor and needs a little stimulation, these latter drinks, in great moderation, may occasionally prove helpful.

Clothing. The clothing must also be specially adapted to the season. It should be light both in weight and color. The underwear may be of very light gauze merino, and the outer garments of loose-woven material. Sudden cooling of the skin must be avoided, and there are times, specially in the mountains, where a sudden drop of many degrees may occur after the sun has gone down. Unless suitable outer wraps are at hand, a chilling of the body may induce sickness of various kinds. Summer colds are apt to be very intractable and may even lead to more serious forms of illness.

Bathing. One of the most healthful summer exercises is bathing. The free use of water on the skin not only removes dirt and perspiration, thereby keeping the pores open, but also is of service in helping to regulate the bodily temperature. A bath may be stimulating, sedative, or cooling, according to the temperature of the water. It may also be considered hot, warm, tepid, or cold, according to the temperature of the water as follows:

Hot, 98° to 110° Fahrenheit.
Warm, 92° to 98° "
Tepid, 85° to 92° "
Cold, 30° to 60° "

It is a mistake to suppose that a cold bath is always the most cooling for the body in very hot weather. While the first effect of cold water applied to the skin is to chill the surface by contracting the minute blood vessels, thus driving the blood inward and producing the familiar goose-skin, there is a secondary dilatation of the vessels, resulting in the glow that is felt in all healthy reactions. The cooling effect is only temporary when a proper reaction occurs.

A more prolonged cooling effect often follows a tepid bath; the reaction is not so marked as the blood vessels do not become so dilated. In a prolonged hot spell, it is sometimes of benefit to allow children to play for an hour at a time in a tub partly filled with tepid water. The restlessness of a hot, oppressive night is often relieved and sleep induced by taking a warm or tepid bath just before retiring.

A few important facts about bathing should be kept in mind; the most important is that one

should always feel refreshed and comfortable after a bath. When the skin glows and the bather has a general sensation of feeling better, the bath has done good. If, on the contrary, there is a feeling of chilliness or depression, the bath has done more harm than good. It must be remembered that while a cold bath is a fine tonic and stimulant to the body, these beneficial effects only occur when the reaction is immediate.

At the beaches every summer one sees both children and adults standing around with blue lips and finger nails. They have stayed in the water too long and have failed to get a reaction. These shivering people, covered with goose-skin, have received more harm than good from the bath. The instant such feelings ensue, the bather should leave the water and briskly rub the skin with a coarse towel to bring on a suitable reaction if possible. This should be followed by a brisk walk or some such exercise. Many bathers stay in the water too long. Twenty minutes is a good average for a bath in cool water during the summer season. A bath should never be taken after a meal, or when a person is greatly fatigued and perspiring from active exercise.

CHANGE OF SCENE

While the well-to-do in our large cities seek coolness and health by removing to the mountains or seashore during the summer months, many thousands cannot afford to travel at this time. With a little extra care, however, many of the disadvantages of the city can be overcome. Perhaps the most important problem is to avoid exercise and exposure to the direct rays of the sun during the middle of the day. If rooms are kept closed and shaded at this time, they will usually be cooler than if they remain open. Provision may then be made for an ample supply of the fresh, cool air of early morning and late afternoon and evening.

Infants and children may be taken out as early as six in the morning and remain in the open air until the sun gets hot, usually about nine or ten, after which they should be kept indoors until late in the afternoon. Open spaces, where there are trees, such as parks or wide avenues, should be utilized as much as possible. Open trolley cars afford a chance for short, fresh-air excursions. In towns that are situated near the water, river banks or ferry-boats can be em-

ployed as fresh-air agencies. These breathing spaces, employed for short periods, morning and evening, often do more good than the long, tiresome, day excursions. The latter are frequently accompanied by overcrowding, discomfort, heat, fatigue, and poorly-prepared food, and these unfortunate influences may entirely counteract any of the good effects of the fresh air during the excursion.

Sometimes even the better-favored do not get the benefit desired from a change to the country or seashore, because of poor hygienic surroundings. A large, well-ventilated room in a city home is frequently better than a small, stuffy chamber in a farm-house. Many a summer boarding-house, with swarms of mosquitoes disturbing one's rest, and the food contaminated by flies, is not healthful. These things and the conditions of drainage and water-supply should be investigated before settling down for a summer outing. It is needless to add that both health and recreation are favored by a change to the country under proper conditions.

MUNICIPAL HOUSECLEANING

Much may be done by the authorities of cities, towns, and villages to conserve health during the heated months. There should be a general clean-up before the hot season comes on if sickness due to the heat is to be avoided. The streets must be kept scrupulously clean. All garbage and decaying animal and vegetable matter should be promptly removed and destroyed. Perishable food stuffs, and particularly cows' milk, require careful watching and regulation. A certain standard of freshness should be required in quickly perishable articles of food or drink.

The number of bacteria found in each cubic centimeter of milk bears a direct ratio to the age of the milk. What is needed is a better regulation of a city's milk supply at its source, namely, the dairy-farm. If the farmer were compelled by municipal rules, carefully laid down and enforced, to regulate the production and handling of milk according to cleanly and scientific principles, and if this milk could be delivered to the consumer within twelve hours, much of the summer sickness would be avoided.

CLEANLINESS IN THE HOME

When food is delivered, the housewife must see that it is quickly placed in a cool, clean spot. There is not much change in milk and other perishable foods when the temperature is kept below fifty degrees Fahrenheit. To attain this end, plenty of ice must always be kept in the refrigerator, which should be opened as little as possible in order to maintain the desired low temperature. The refrigerator must be frequently washed and kept scrupulously clean.

Food of all kinds should be promptly removed from the table as soon as a meal is ended. Decaying refuse must not be allowed to remain long in the garbage pail, which should be screened and placed in a dark spot so as not to attract flies. Cistern water must also be screened, and no puddles allowed to form about the place.

MODIFICATION OF AIR BY TREES

A very efficient way in which a city can modify the deleterious effects of the heated term is by planting trees and furnishing small parks and

breathing-places. Several years ago one of the health authorities called attention to vegetation as a remedy for the summer heat of cities. In this article it was shown how trees are of the greatest utility in modifying and equalizing climatic conditions. It is a well-established fact that an average temperature of the air of fifty-four degrees Fahrenheit is best adapted to public health, as at that temperature the decomposition of animal and vegetable matter is slow, and normal temperature is most easily maintained. Every degree of temperature above or below this point requires an action of the heat-regulating powers of the body to maintain a proper equilibrium.

As the heat-regulating centers in young children are most unstable, the direct action of prolonged heat on their bodies is a powerful agent in increasing summer mortality. In a large and densely populated town, the solar heat is conserved and reflected by the stone and asphalt of the streets, as well as by the bricks and mortar of buildings. The artificial heat generated in the latter for cooking and manufacturing purposes is also a factor to be considered. Even

during the night, the stones, by retaining their heat, prevent any fall in temperature sufficient to afford relief.

Here is where the modifying effect of trees would be most beneficial. As trees maintain an average mean temperature of fifty-four degrees Fahrenheit in all seasons, it is easy to see what a constant cooling influence they would possess in an atmosphere of ninety degrees Fahrenheit. Add to this the constant exhalation from the leaves of water vapor that has been absorbed from the moisture in the soil, as well as from the surrounding air, and the cooling effect is much enhanced. This takes place most actively during the heated portion of the day, when it is most needed.

A general purification of the air is not the least benefit to be derived from vegetation, as carbon dioxid gas is absorbed and oxygen given out, which is just the reverse of the process that takes place in animals. Animal and plant life thus act as complemental influences.

The Tree Planting Association of New York has proved that certain species of trees are adapted to city soil and, with a little extra care,

can be made to thrive. If our blazing thoroughfares were lined with shade trees, the summer heat would not be so intolerable and unhealthful.

CHAPTER XI

HEALTH IN CITY AND COUNTRY: LOCAL INFLUENCES

ONE of the most remarkable social movements in recent years has been the rapid growth of cities. This has not been confined to any one country, but has been a world-wide movement. In the United States, in 1800, three per cent., and in 1900, thirty-three per cent. of our population lived in cities. The Census Bureau has made estimates based on the rate of population increases from 1900 to 1910, disclosing the fact that forty and nine-tenths per cent. of the country's inhabitants now live in cities of more than eight thousand as against thirty-eight and nine-tenths per cent. in 1910.

All great social movements have causes that should be carefully investigated before trying to alter or condemn them. Most people who pour into our cities go because they get more money, and, on the whole, are better off than in the

country. Manufactories employing much labor and paying good wages are nearly always located in cities, and this economic movement is growing. Men will always go where they can make the best living. In addition to this, there are social needs that the city in many ways meets better than the country. This exemplifies the old scriptural adage that "man doth not live by bread only."

Many problems have been raised as to the ultimate effect of city life upon the race. The most pertinent question naturally concerns health. Some gloomy prophecies have been offered about its degenerating physical effects upon future generations. A careful study of this question, however, will show that, contrary to current belief, the average, modern city-dweller is usually healthier than the resident of the rural districts. An effort must be made to find out what conditions in both city and country tend to impair health.

CITY CONDITIONS

In the city the outside air is not so pure as in the country owing largely to its being more dust-laden. This dust consists of minute par-

ticles worn off from pavements and buildings, of waste materials from stores, factories and houses, of the dried detritus from animals and human beings, of food-waste and of various micro-organisms. These substances are carried about by the wind and by automobiles or other vehicles. Such impurities are more harmful in summer than in winter as there is a greater abundance of dust, with the decomposition of the particles of animal matter contained in it. As windows are usually open at this time, the contaminated air has free access to houses.

City streets should be well watered during the hot season to prevent the spread of dust. It is, of course, during the heated term that the city suffers in health from unfavorable atmospheric conditions.

Attention has been called in a previous chapter to the manner in which trees modify and purify the air; their growth in cities should certainly be encouraged. This not only makes for health, but beautifies the surroundings. Cities that have streets lined with trees are much more attractive than those with bare stone walls as the only background.

Many small parks also add to a city's health,

not only by affording recreation places, but also by giving space for vegetation. Sections that are overcrowded not only suffer from impurities in the air and in the general surroundings, but favor the spread of disease by the close contact of individuals. Improved tenement-house laws that provide for sufficient air-space and access to sunlight, have bettered the conditions in many large cities. The rear tenement, and rooms opening on small, dark air-shafts, have time and again been causes of physical decline in the occupants. The famous "lung" block in the slums, reported many years ago, where tuberculosis was fearfully prevalent, formed one of the plague-spots of New York due to dense overcrowding in the dark, unventilated rooms of rear tenements. Fortunately most municipalities are now alive to the importance of this subject, and are enforcing building and tenement laws tending to abate these evils.

GARDEN CITIES

For those who are obliged to live in the congested areas of large cities, the garden city suburban idea, first developed in England, offers a good solution. These ideal towns have been

built around some of the great centers of population to which they have easy and quick access. Land in these towns, free from speculative influences, is parceled out in large lots, and good-sized spaces are set aside for parks and playgrounds. The people are particularly encouraged to cultivate gardens, in order that the houses may be surrounded by flowers.

A study of the children brought up in these surroundings has shown them to be larger and healthier than those living in the slums. Hampstead is one of the best examples of these garden cities. The problem of health in the city is connected with the slum-dweller, not with the individual who can live in the better part of the town

COUNTRY CONDITIONS

Good drainage and a plentiful, wholesome water-supply are essentials to good health in every community. It is in these elements that the city is frequently better placed than the country. The latter has to depend largely upon wells and cesspools for water supply and drainage, and, without constant hygienic oversight, unwholesome conditions can easily prevail. In winter and early spring the soil gets saturated

with moisture, the exhalations from which favor various catarrhal conditions. This is one reason for the prevalence of different forms of influenza and grippe.

In a well-organized city, the soil is completely covered in by pavements, and drying quickly takes place as the slush and water drain into sewers. There is no doubt that such conditions have a great influence on health.

It is a remarkable fact that for some years the death-rate of New York City has been lower than that of rural New York. When we consider the dense population and overcrowding of the city, the poverty and ignorance seen in large masses of people, the heavy infant mortality during the summer in the crowded tenement houses, and the large hospitals and other institutions full of human derelicts, we can appreciate what this means as to general conditions of health. This favorable showing is due to a purer water-supply, to good natural and artificial drainage, and to a watchful board of health, which has the power to regulate health conditions in the homes and habits of the people. These form the influences that are somewhat lacking in many rural districts.

Much sickness could be prevented among the poorer classes in the country if such agencies as welfare-stations, district nursing, and dispensaries for ambulant cases of illness could be established. This would mean free advice in many cases of incipient illness that are liable to eventuate in prolonged or chronic disease if not corrected in time. A quick diagnosis in such diseases as diphtheria often requires a laboratory, and a life may often be saved by an early report followed by immediate treatment. It is in the lack of such facilities that many parts of the country suffer in comparison to the city.

Coming to the home and the school, they are, as a rule, not so sanitary or so well-organized for health in the country as in the city. The operation of general hygienic science has not been very actively carried out in the country for lack of proper organization. As far as there is any physical inferiority of the country to the city dweller of the same class, an explanation is found in the causes just enumerated.

In the matter of food, a greater diversity can be found in the town, and nutrition suffers when a variety of articles that will appeal to appetite and digestion cannot be readily procured. The

rosy-cheeked farmer's daughter is not so often seen in real life as in fiction. The standard of living as regards heating and ventilation in many homes of the sparsely settled country districts is not in favor of healthy development.

RURAL SCHOOLS

The rising generation usually suffers most from hygienic disadvantages. In a recent article, Dr. Thomas D. Wood has given some interesting data as to the condition of children attending rural schools. He found that more than half of the twenty million school children in the United States are attending these country schools. In a carefully prepared table, which includes all parts of the country, it is shown that children attending the rural schools are less healthy and are handicapped by more physical defects than are the children of the cities, even including those living in the slums. Dr. Wood finds that more than twice as many country children as city children suffer from malnutrition; the former are also more anemic, have more lung trouble, and include more mental defectives than do the latter.

In order to remedy this condition, the Health

HEALTH FIRST

Committee of the American Medical Association and the National Council of Education have tabulated the following measures to try and conserve the health of rural school children:

1. Health examination and supervision of all rural school children.

2. Dental examination and care for the teeth of all children in the rural schools.

3. The service of the school or district nurse to provide practical health service and "follow up" work. The work of the nurse is even more vitally important in rural than in city schools.

4. Warm school lunches for all school children in rural as well as in city schools. The indirect educational benefits of the school lunches upon the children and the homes are even more important than the immediate health improvement of the children themselves.

5. Correction of physical defects which are interfering with the health, the general development, and progress of rural children. For this remedial and constructive health service, practical rural equivalents of medical clinics, dental clinics, and community health centers of the cities are urgently needed in all parts of the United States. The county unit of organization and administration for health as well as other rural interests has already proved successful and promises the best results. Every county should have one full-time health officer, one or more school

and district nurses, and one or more community health centers to provide rational, self-supporting health and medical service for all the people.

6. Cooperation of physicians, medical organizations, health boards, and all other available organizations in the rural health program.

7. Effective health instruction for the rural schools which shall aim decisively at the following results: (a) Establishment of health habits and inculcation of lasting ideas and standards of wise and efficient living in pupils. (b) Extension of health conduct and care to the school, to the homes, and to the entire community.

8. Better trained and better paid teachers for rural schools, who shall be adequate to the health problems as well as to other phases of the work of rural education.

9. Sanitary and attractive school buildings, which are essential to the health of pupils and teachers.

10. Generous provision of space and facilities for wholesome play and recreation.

11. Special classes and schools for the physically and mentally deficient, in which children may receive the care and instruction requisite for their exceptional needs.

It may be suggested that it would be too expensive to carry out such a program, but eventually even larger sums will have to be expended for the relief of sickness, inefficiency, and various

forms of disability. Such a scheme would have a beneficent effect upon the health of all classes in a rural community.

In the matter of fresh, clean air, free from human exhalations and bacteria, the country, of course, has the advantage. Any dust that may occasionally be present comes more from dirt pulverized in the roads than from particles of decomposing animal and vegetable detritus. The oiling of roads does much to lessen its disintegration by frost and rain and the spreading of dust. Oiling should be repeated frequently enough to prevent drying, which may be followed by particles of irritating tar oil being carried about by the wind.

In furthering the health movement, city and country have special and often divergent needs, and much more may be accomplished by both in the line of conserving health and vitality. So far, however, the country has lagged behind the city despite the natural advantages of purer air and lack of crowding. In any locality the death rate can be lowered and the public health enhanced if the community is willing to pay the price. The idea is well expressed by the Department of Health of New York:

"Public health is purchasable. Within natural limitations a community can determine its own death-rate."

CHAPTER XII

HEALTH AND HAPPINESS: MORAL INFLUENCES

WHILE health is one of the first prerequisites of happiness, we must not overlook the fact that happiness has a strong influence in the production, as well as the continuance of health. Happiness should thus be sought and cultivated if only for the sake of good health. The unhappy are rarely very healthy.

PHYSICAL CONDITIONS

Unhappiness, if continuous, usually leads to a nervous depression that tends to a lowering of all the vital processes. Digestion and assimilation suffer first, followed by a general lessening of glandular activity. The internal secretions of the various ductless glands, whose effects on physical condition and vitality are so large, are greatly influenced by mental states. These secretions, that may act depressingly on the body when disturbed by worry or anger, tend to revert

to a more normal state under the influence of confidence or hope. Their proper functioning is always aided by a good mental equilibrium.

The circulation may also be affected, as shown in an acute way by the sudden pallor of a face at the receipt of bad news. If even the minute capillaries are thus quickly affected by a mental impression, it is not difficult to understand how the heart and circulation may be constantly affected by chronic worry and unhappiness. It is evident that the latter influences, if prolonged, may have a distinct effect in undermining health.

The effect of ill health upon one's disposition, strange to say, varies somewhat with the parts affected. The great vegetative organs of the body are lodged in two large cavities of the trunk, separated by a thin muscle, the diaphragm, corresponding roughly to the waist. The chest cavity is above, containing the heart and lungs; below is the abdominal cavity, holding principally the liver, spleen, pancreas, kidneys, stomach, and intestines.

If disease attacks the organs above the waist, even when severe, the general spirits are not apt to be much affected. Below the waist the case is different, especially when the liver or stomach

and intestines are involved; even mild seizures here cause depression of spirits and discontent. A person may be plunged in the depths of despair by a simple functional dypepsia. Many people with chronic diseases, although not possessed of much strength or vigor, live comparatively happy lives, if their digestive organs functionate fairly well. On the contrary, the dyspeptic individual, no matter how strong he may otherwise be, is rarely happy. The lesson is not hard to apply.

MENTAL INFLUENCES

The possession of a proper sense of humor makes for happiness. With this function developed, even misfortune may often present streaks of amusement that will make it more tolerable. There is a constant, if small, enjoyment to be derived by the humorous mind from the daily incidents of life that will do much to ease the cares of existence. A tragical situation may often be lightened, if not averted, by a smile.

Another underlying condition of contentment is not to take oneself, or even the affairs of life, too seriously. In looking back, every one can see how much unhappiness has been derived

from an overweening sense of one's importance. Each person is apt to think that his or her troubles are unusual and correspondingly hard to bear. A larger insight will show that others have equally serious troubles, and that misfortunes are fairly well distributed. The constitutionally depressed must be taught to dwell more on the bright side of things. Their outlook on life must be recreated and a reëducation in happiness undertaken. Most anticipated evils never come true. It is also well not to expect too much in life. A very common source of unhappiness comes from anticipating too much from the various relations of life. An old proverb attributes happiness to him who expects little and thereby avoids disappointment. While we must always try to cultivate cheerfulness, there is occasionally seen a tendency to play the glad game of Pollyanna more strenuously than the occasion warrants. In the long run, a medium ground between too much elation or depression will be the safest. The hard and stern facts of life will have to be faced as well as the responsibilities that accompany a recognition of these facts. There is both a wrong and a right side to many questions, and we must range ourselves

on one side or the other. But underneath all, the optimistic spirit helps and elevates. It will put one in the way of living earnestly, bravely, and cheerfully.

MENTAL HEALING

The effort to influence the body by the various activities of the mind has been much emphasized in recent years, and various systems have been launched with this as the exclusive method of operation. Attention has been called in a previous paragraph to the way the body may be depressed by low mental states. Acting on this principle, various sects have been organized and extravagant claims put forward. People who have been restless and depressed become contented and fairly happy. It is for this reason that it seems well to apply the pragmatic test to any system and inquire, "How does it work?"

In studying the operation of any cult, we must consider not only its immediate effect, but its ultimate influence upon the individual and the community. For the neurotic person, the immediate effect frequently appears to be good. A well-to-do, nervous woman, who has not enough of the real things of life to occupy her

mind, becomes restless and unhappy. Her health suffers and imaginary diseases occupy her attention. She goes from one physician to another, and her various organs are scrutinized by specialists. Unfortunately, many physicians fail to recognize the type, and a few are willing to exploit it; so that no real service is rendered. Such a person needs occupation, with mental and moral toning-up, rather than medical advice. The old Egyptian idea of combining priest and physician was not without its advantages. Many restless, discontented, ailing people seek the aid of physicians who really require psychologists or moralists to try and minister to their needs.

Such an unsatisfied, neurotic person after having many affections, most of which are completely or partly imaginary, and having consulted physicians without relief, finally gravitates into the care of some healer. The latter is apt to be a woman with placid face and personality, dressed in the height of fashion and radiating prosperity and happiness. She thoroughly understands the type with which she is dealing and speaks soothing words about the "All-Good," and the "spiritual thought that will cast out the qualities of the carnal mind."

One by one the distressing ailments disappear and the restless person becomes fairly saturated with happiness. A strange fact may be here noted. Different sects, claiming to act from the most diverse principles, all have much the same effect. Each of these differing cults aims to influence bodily functions by the exercise of mind or will power. Experience shows that a certain class in every community is impressed by the pronouncements of these various cults, especially those claiming psychic or supernormal powers. The trained mind, accustomed to weigh and analyze evidence, can easily detect the fallacies and partial truths that are covered by vague generalities. The unthinking may not find it so easy.

Every one knows that all these sects have more or less influence in selected and special cases. The mental composure that some nervous and imaginative people derive from these faiths is given as a sort of explanation as well as palliation of their existence. A similar composure as well as a partial success in certain kinds of healing is attained by East Indian fakirs in the same manner as that attained by a so-called Christian sect, both aiming to produce in the

brain an abnormal state of either quiet or excitation.

INFLUENCE BY SUGGESTION

The root principle of all these systems, no matter how diverse their apparent action may be, is always the same — suggestion. There is probably no principle so widely applied in every-day life, consciously and unconsciously, in various ways. It undoubtedly has a place as in the treatment of disease, especially of the nervous variety. Every successful physician sometimes employs suggestion, in connection with other treatment, in certain ailments. This is very different from its exclusive employment by those who are ignorant of the structure and functions of the human body and of the natural history of disease. It is proper to add that permanent benefits from treatment by suggestion in real disease are comparatively limited and untold harm often results from the efforts to use it to the exclusion of rational treatment.

When we see a neurotic person relieved of forebodings by the various methods of mental impression, whether called faith cure, new thought, mental healing, or Christian Science,

the sympathetic friends shake their heads and say, "There must be something in it." There is something in it — always the same "it," one of the diverse forms of mental suggestion. A careful observer may likewise note that many of the extreme forms of suggestion end in an atmosphere of delusion in which the facts and realities of life have small place. Trouble and sorrow seem to fade away in a blunting of the senses by a sort of auto-suggestion. A state of mind is now reached in which one dodges the actual problems, diseases, and tragedies of life by denying their existence. What an easy way to rid oneself of the difficult work of dealing with hard facts! It is possible that temporary happiness may be attained at too great a cost to the individual and the community. A shifting of responsibility for suffering means an extra load for some one else to bear. It thus eventuates in a sort of satisfied selfishness that gradually becomes callous to many of the real troubles of life. There is scant provision in this happiness scheme for those who really "labor and are heavy laden." It is rather a luxury for the self-satisfied and well-placed. All false ideas, no matter what their immediate effect may be, are

eventually and intrinsically harmful. It is not wise or human to fill the mind with beautiful abstractions or a mystic optimism that does not involve a direct, concrete obligation of service.

It is thus desirable in our pursuit of well-being to make a sharp distinction between temporary and permanent happiness. The former may often be secured by a dulling of the senses or false hopes; the latter can only be obtained by depending upon truth and reality. The peace that comes from worthy effort in recognizing evils and overcoming them will always lead to the truest and most lasting happiness. Finally, truth is better and higher even than peace; any attempt to obtain the latter by ignoring the former will be short-lived and unsatisfactory.

COMMUNITY RESULTS

In discussing this subject, we must not forget that the physical, mental, and moral health of the community is involved in the operation of these cults. This is especially true of Christian Science on account of its speciousness and the activity of its propaganda. In one of its aspects, this cult may seem to present a comparatively harmless side; in another it appears

absurd; but in a final estimate it is always liable to show a cruel or tragic aspect. Unfortunately, the helpless child is apt to be the chief sufferer. The danger to the community lies specially in the fact that communicable diseases may be handled by this sect. One of the healers wrote that she had treated "hundreds of cases of measles, typhoid, scarlet, and slow fevers" with, she thought, success. Assuming that part of these illnesses were properly diagnosed, the final results must be unknown.

How can people, who confessedly have not made a scientific study of the pathology and natural history of disease, give reliable reports as to the results of any or no treatment? Many of them deny the real existence of the very diseases they pretend to cope with successfully. Every thinking person must realize that reports and statistics of ordinary or miraculous cures from such a source cannot stand real investigation. Yet such statements sometimes influence people who are not accustomed to verify claims when positively made. When these assertions are coupled with generalities that sound elevated and pious, the unthinking may be impressed.

Even scarlet fever may be treated by high

thoughts and lofty utterances. Those who have scientifically studied this malady are constantly looking for some of its insidious, severe, and permanent complications. Some cases, however, as we all know, are mild in type and need no special medical treatment except careful watching for complications and an avoidance of the spread of infection to others. The only way to detect these complications is by careful examination of the vital organs liable to be affected by the poison of the disease. The various healers are not competent to do this; therefore the eventual results are unknown. One of the cases referred to above, having a "claim of diphtheria," "passed on." How many other cases of infectious diseases thus treated finally "passed on" or are now passing through life with crippling and avoidable complications, no one will ever know. Neither will it ever come to light how many cases of scarlet fever and similar dangerous infections have been spread to others by this sort of treatment. Here lies the most serious social aspect of this question to the community.

A teacher in a public school recently reported the death from scarlet fever of one of her most

promising pupils. Investigation showed no possibility of infection in the home and apparently no cases at school. The mystery was soon after solved by a Christian Science mother telling the teacher that her child, in the same class, recently had a "false claim" of scarlet fever which she had quickly controlled and the child was soon sent back to school. Comment is unnecessary. Careful, conscientious teachers are very much afraid of this cult after having seen such things happen. Mild cases of diphtheria, measles, and similar diseases are spread in the same way. While this cult has evidently reached the acme of its influence, others with similar action will take its place, and the effect upon the community must always be considered.

Many irregular systems of medicine get great credit from their handling of light attacks of the communicable diseases. We all know, however, that the milder forms are the most dangerous in the spread of infection and that a light case in one may produce a malignant and fatal attack in another. The public is sometimes confused by seeing patients recover from disease without medical treatment. This is easily explained.

PHYSICIANS AID NATURE

The scientific physician does not pretend to cure maladies by drugs or medicines. Nature performs the cure. All diseases are self-limited and end in complete or partial recovery or in death. By understanding the natural history of disease, however, the physician aids nature at a critical point in her struggles. This may be accomplished in many ways. He may assist in the elimination of rapidly collecting poisons, or in sustaining a failing heart or relieving a congested lung. By many similar actions, the physician daily saves lives that would otherwise be lost. Needless death and disability are frequently avoided by the art of the scientific physician. It is in imaginary, functional, or quickly limited diseases that the patient may get along well without any special treatment. Unfortunately, the mental healer does not always attend this kind. Imaginary cancers disappear, but the real ones persist, with the hopeful time of early removal irrevocably gone. Incipient tuberculosis and many other diseases, in the early and curable stage, are allowed to become chronic and hopeless. The real diseases eventually get into

the hands of the physician, but often too late to save health or life. Here is where the tragedy comes in.

It must be remembered that to some, mental healing, apart from its sordid and commercial side, represents a reaction against much of the gross materialism of the day. Physicians and teachers must take account of this bald materialism and be careful not to yield too much to it. The great majority of the human race will never face the brutal logic of pure materialism. The true leaders of religion and medicine, clergymen and physicians, must guide the popular thought in these matters and not allow the field to remain in possession of moral quacks. But we must not try to detach the spiritual from the material as both are exemplified in actual life. The real thinkers must utilize the modicum of truth possessed by all these systems to be rationally utilized as far as it can be safely and properly applied. The credulous and distressed can thus get any inherent benefit without being exploited.

EFFECTS OF MATERIALISM

The wide-spread materialism of to-day is responsible for much discontent. Materialism

that is interested only in eating, drinking, and striving to be merry does not make either for health or for happiness. It is too ephemeral. The senses fail to react to the old stimulation, and the body wears out. The whole material fabric of the world is in a state of constant flux. The mind that is engrossed in materialism has nothing permanent to grasp and hold. As this slowly dawns on the consciousness, a restless unhappiness settles on the passing life. The need of the day is faith in something more enduring. The so-called ages of faith, however, have passed, and, in so far as they were likewise ages of ignorance and superstition, we may not unduly grieve. Yet a strong and simple belief is a help both to health and happiness and hence should be cultivated.

It is a strange fact that while materialism is growing stronger with a large portion of society as a social force, with the thinking classes it is losing ground as an interpretation of life. Despite a powerful drift toward this materialism, there is a strong counter-current among some of the finest minds of the day toward spiritual concerns. This is having a stimulating effect upon all life. It should leaven and energize both

church and state and disseminate an atmosphere of cheer and encouragement that will aid both body and mind. Cheerfulness is, to a certain extent, a habit, which, when once formed, has a beneficial effect upon all conditions of life.

Finally, health and lasting happiness must be based upon a belief in the moral order of the world and upon faith in a Supreme Being who is working by means of the laws of life and nature for the ultimate good of the race. If we try to understand these laws and live as far as we are able in conformity with them, we will make the best of our lives. The ultimate result of life will be *ourselves,* also our deeds for good or evil. Let us strive eagerly for health of body, mind, and spirit, and face the facts of the world and of life as they are, always doing our best in spite of wrong directions or darkening tragedies. The highest results will be attained by cultivating an optimistic spirit and working, not only for ourselves, but for others. Happiness is a state that comes easiest when unsought.

As the body decays, let the spirit remain serene in the belief that life in its widest conception is more than meat and drink and opens out the greatest possibilities. In the unending order of

nature, birth, development, and death form the cycle that comes to all. If the body can be properly attuned to life, death will finally come as a sort of normal and peaceful ending.

The complete life then requires a cultivation of the spiritual as well as the physical and moral sides of our nature. This must involve faith in a spiritual realm outside ourselves with which we may be in relation, and the "will to believe," as James the great philosopher taught, will help us attain it.

To make for lasting happiness, we must try to enter into the belief of the seer who, even in troublous times, could sing:

> "God 's in his heaven:
> All 's right with the world."

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